School Shop

vol. XX no. 1
SEPTEMBER 1960

Industrial Arts for the Academically Talented
by George Storm

Kenya: A Challenge to Industrial-Arts
by Thomas J. Brennan

All's-a-Poppin' in This Shop
by Albert Meyer

Cover Story: SCHOOL SHOP cartoonist, M. Lawrence Zanco, shows more graphically than can be described how we all feel at this time of year. With this issue, SCHOOL SHOP magazine begins its 20th year of service to teachers of industrial education. So what the teacher has to say about students at the start of this year, we have this to say of the years ahead: "Let 'em Come."

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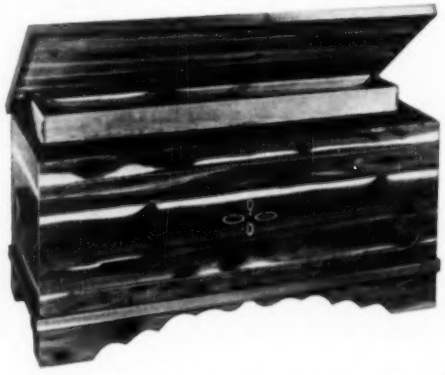

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

No Standing Still

We are on the threshold of a new school year so a look at where we are going in industrial education and how we will probably get there is appropriate.

Item 1.—The science and math emphasis is still going strong although sputniks are beginning to clutter the heavens. In some places, sad to relate, industrial education is being cut, as far as time in the school day is concerned, to make way for other curricular offerings that the Russians have scared us into making. (Ironically, the Russians are now reversing themselves and putting much more emphasis on industrial education.)

There is no doubt that we need to strengthen our program, especially in industrial arts, to make it as sound educationally as possible to meet this competition for the time of students. We need to beef up our course content so students are challenged by what we offer. We need to correlate more directly with science, math, and other so-called academic areas of the school curriculum by teaching for the interrelationships that exist and by working together in laboratory situations with these other areas.

We need, furthermore, to acquaint principals and superintendents, board-of-education members, the public, and students themselves with the objectives and educational opportunities found in industrial education. Part of the present problem of our lack of strength has been our failure to do this in the past.

Item 2.—Federal support for general education seems more imminent than ever before. Industrial-arts people, particularly, need to be prepared to present their case so it will receive an adequate hearing and so that industrial arts will get its just proportion of whatever federal funds become available.

There is a possibility that should federal support come in substantial amounts then Smith-Hughes Act and George-Barden Act funds might be amalgamated with general federal support. While this is not an immediate possibility, anticipation of such an eventuality calls for some thinking and planning now as to what policy should be followed.

Item 3.—A head of steam is gradually being generated in the program for training technicians at the 13th-grade and 14th-grade levels. Each community needs to plan how this type of training can be provided.

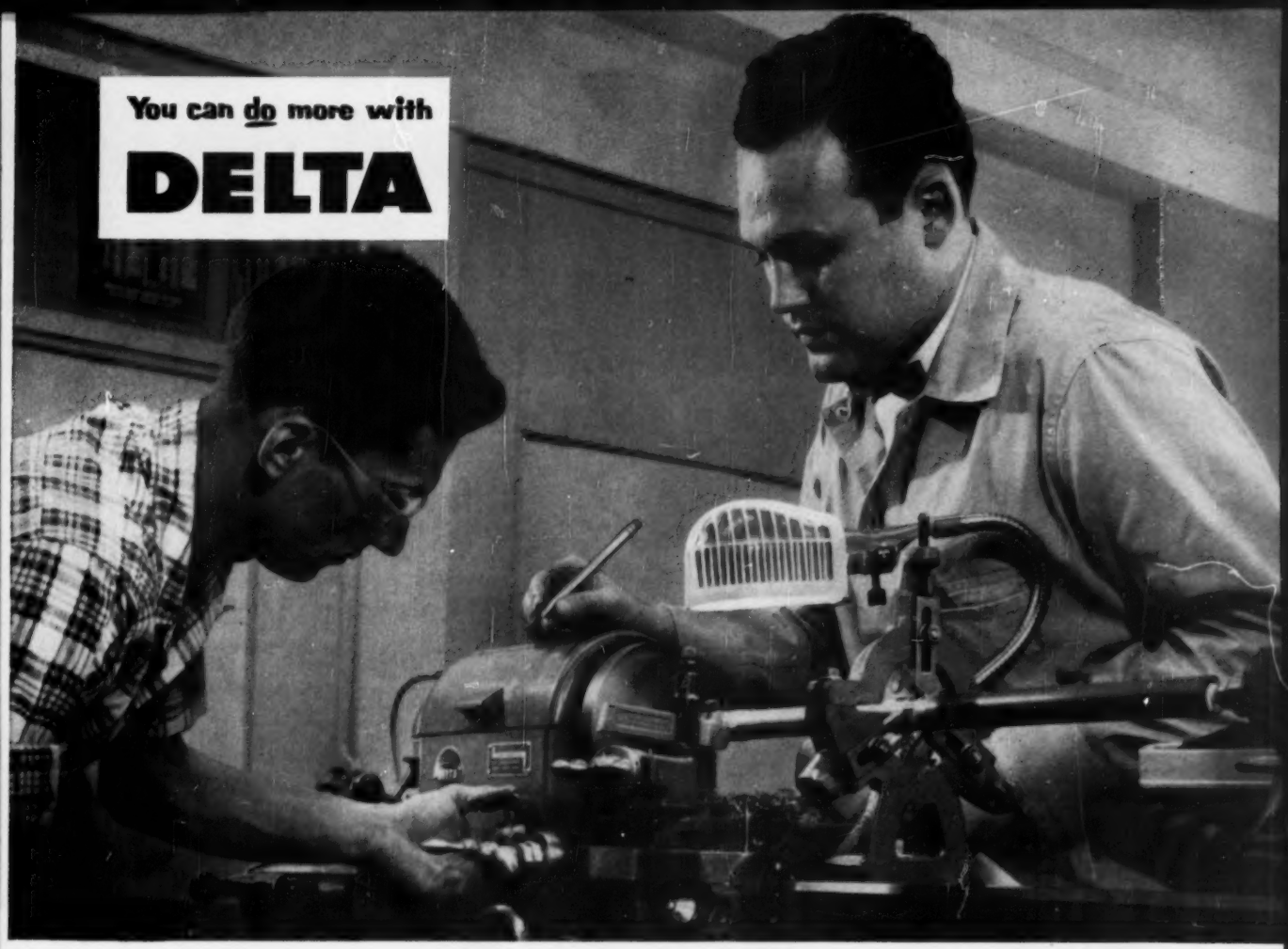
Problems of great magnitude have to be solved before, as well for when, the technician-training program gets under way. Each community or area needs to know the industrial demand for technicians. The ability of the community to support such a program financially, even with state and federal support, needs consideration. The mechanics of combining the resources of several comunities to make possible a training program raises legal and administrative problems. Teachers who are qualified are difficult to find and to hold once they are found. So far the program has lacked the status and the prestige necessary for student, community, and academic acceptance. Obviously, much remains to be done.

Item 4.—The professional organizations in industrial education need greater support and more vigorous programs to merit such support.

The AVA has a high percentage of the T&I teachers in its membership, but the emphasis of the organization is on federal legislation. Its program needs broadening to serve other professional and educational purposes.

The AIAA has only a small portion of the total number of industrial-arts teachers enrolled as members. In recent years, it has become much more active, but it has been handicapped by a lack of teacher support. It needs broader support and a more vigorous program to promote industrial arts and to give professional help to teachers.

In conclusion, education is not standing still and industrial education cannot afford to stand still. Every school, every shop, every teacher has a responsibility and a right to move ahead as the world shrinks and the universe expands.—**L.W.P.**



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IN THE MORNING MAIL...

(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

Our office read with more than ordinary interest your editorial on "Course-of-Study Standards" in the June issue of SCHOOL SHOP.

Our trade and industrial staff is in full agreement with your philosophy, and many of your statements in the editorial are things we have stated to our instructors and supervisors many times. I was especially pleased to have you document our thinking. As you know, there are some educators and guidance people that have other thoughts on these procedures.

Under separate cover we are sending you samples of the procedures we have used in developing instructional materials and standards for our technical programs. . . .

Keep up the good work!

John R. Plenke,
Chief, T&I Education,
Wisconsin State Board of Vocational and Adult Education,
Madison, Wis.

Dear Sir:

May I add my name to your long list of admirers. I think SCHOOL SHOP is needed by all who teach industrial arts. A good teacher is in a constant search for new, workable, efficient ideas to aid him in his teaching. I know of no better source than SCHOOL SHOP. Thanks for a job well done.

George B. Traub,
Secretary,
New Jersey Industrial Arts Association.

Dear Sir:

Bravo! The editorial by Thomas Diamond in the May issue of SCHOOL SHOP ("How to Get Better Teachers") was well written, timely, and effective. My only regret is that it will not be read by many of the culprits discussed.

After teaching in the T&I department at the junior-college level for six years, I can only say that I would rather have high-school graduates who have not been in classes with IA "teachers" of the kind mentioned who think they have learned all there is to know in a given subject area taught at the hobby level.

We need action on this front. Keep up the good work.

William A. Stanton,
Costa Mesa, Calif.

Dear Sir:

I have read with interest the April issue of SCHOOL SHOP and find it an exceedingly valuable document. I wish to compliment you on having directed this entire issue to public relations because this is one of our weakest points. I wish that we could offset some of the unfavorable publicity that has been given to industrial arts and vocational education through published articles in magazines which are read by lay people.

Roy G. Fales,
Chief (Retired), Bureau of Industrial Arts Education,
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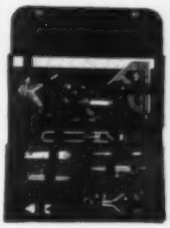

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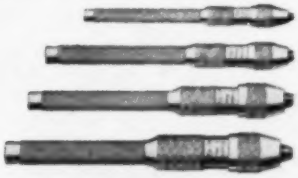

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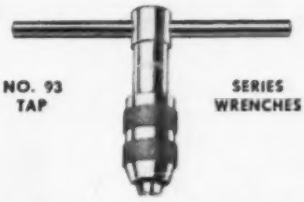

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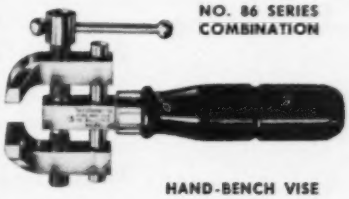

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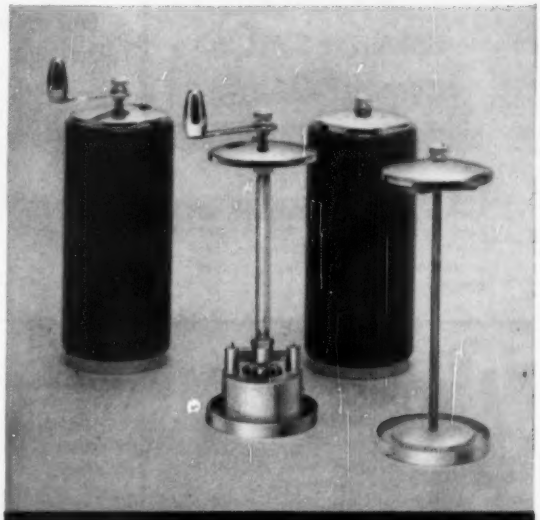

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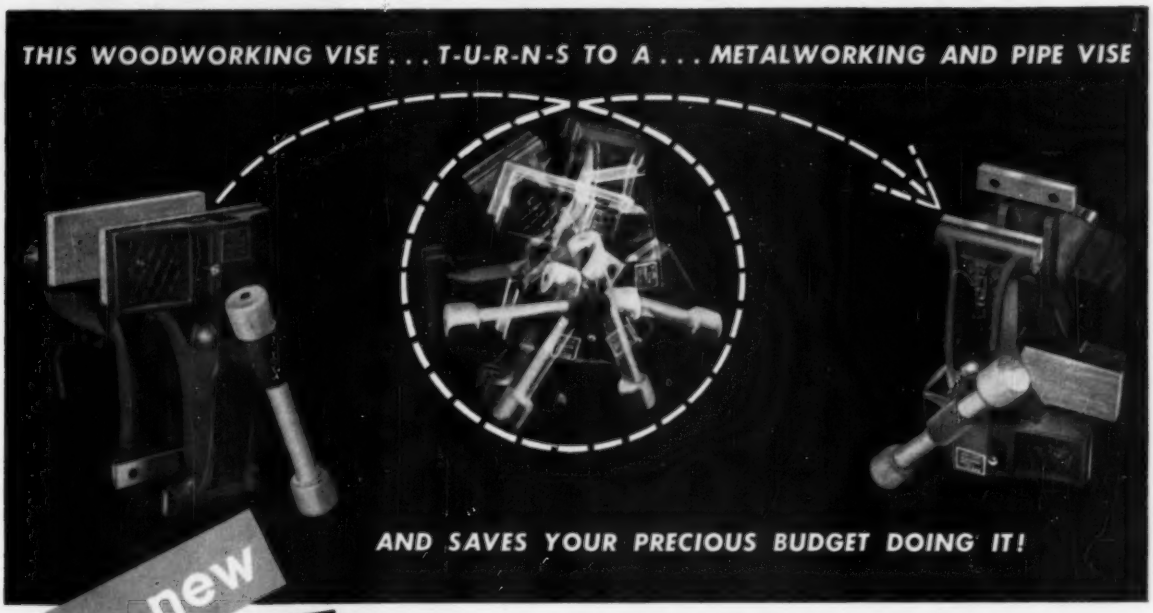

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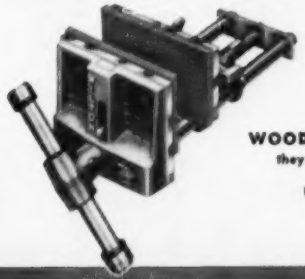

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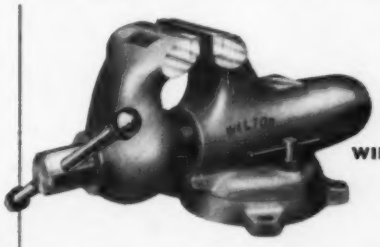

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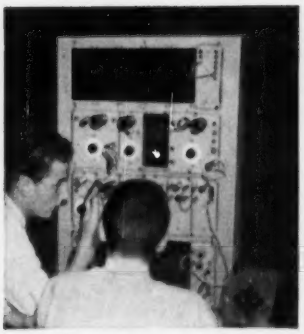

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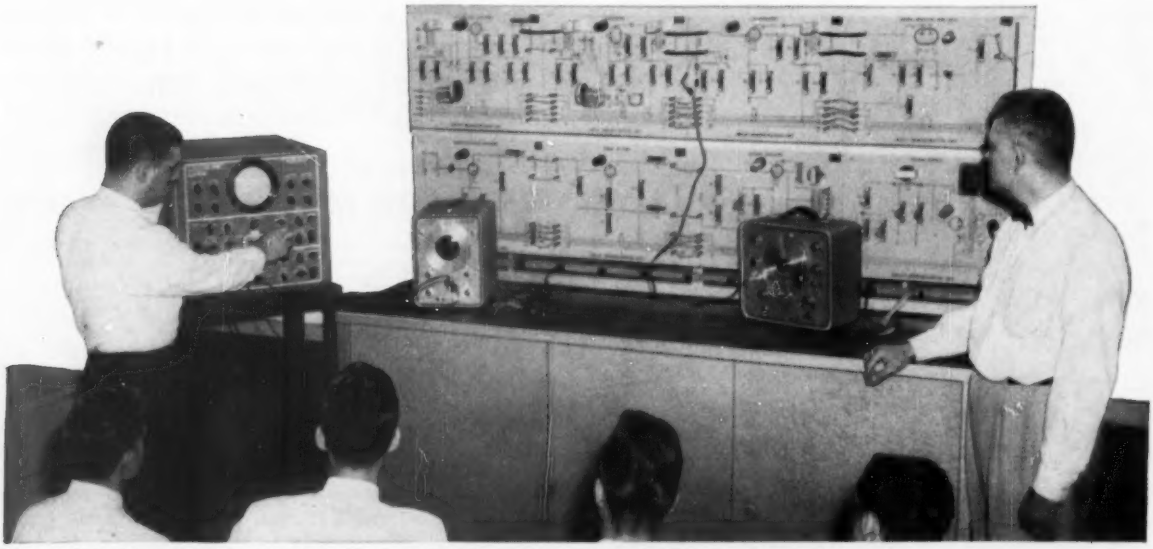

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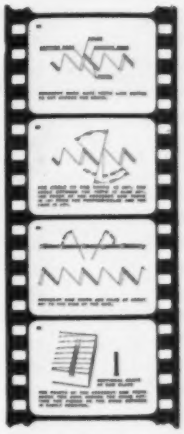

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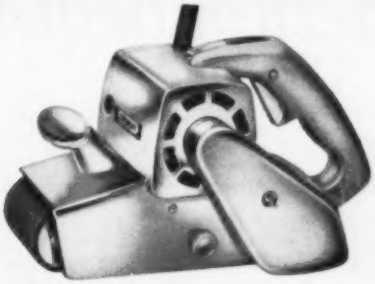

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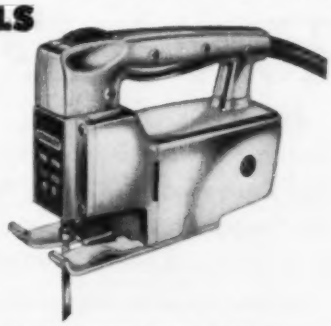

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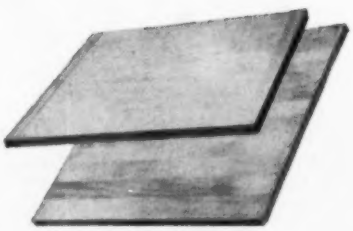

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Industrial Arts for the Academically Talented

By George Storm
Head, Industrial-Arts Department, Fullerton, California, Union High School

Maureen McCoy and the frames she made for films illustrating mineral surfaces.

BACK in 1958-59 when we started planning an industrial-arts course for the academically talented students in our high school, we kept wondering how far we could go without encroaching on the science department's territory. As it has turned out, we went as far as we wanted to go in our planning, and instead of encroaching on anyone's territory we found ourselves – teachers, students, *et al.* – in "mutual interest land" instead of in somebody's "private reserve."

Our course for the academically talented is still an experiment. This experiment was inspired by the urgent need for an industrial-arts course for students whose interests and abilities were in science and engineering. The course, which developed out of conferences with teachers from other subject areas, is in its second year. It is a little early to make any definitive statements about the course, but some things about it are beginning to be apparent.

We have not solicited *direct* reactions from any of the students enrolled in the course, but *indirectly* – from faculty members in other departments – we are learning that the boys feel extremely favorable toward it. They tell their other teachers that the wide range of experiences, including field trips and lectures by visitors from industry, are very good. The only unsolicited comment that we have received to date from the students is that they wish the course were two periods long instead of one. Needless to say, this is an unusual but nonetheless very gratifying reaction, particularly when none had been sought.

Reaction to our experiment from outside of our high school has been equally encouraging. Stanford University at Palo Alto, Calif., accepts the course as academic credit. In the future, we are going to survey other colleges and universities in our area to learn how they feel about what we are doing. For the present, however, the Stanford acceptance is sufficient indication to us that we have hold of something pretty good for our academically talented youngsters.

At the present time, the teaching is exclusively by industrial-arts instructors. Our physics teacher, though, has practically the same students in his class because physics is a prerequisite for the special industrial-arts course. It is not any coincidence, then, that many of the projects made in the Engineering Mechanics class – that's the name of the special course – are also accepted as science projects.

Course Content

The laboratory activities of this class are in the metal, wood, plastics, electronics, and auto shops of the industrial-arts department. During the first semester, the class is rotated through all of the shops. They spend a specified period of time in each shop. The greater part of the work, however, is done in the metalworking shops because most of the industrial-type tools, machines, and other equipment are there. When the class does move to another one of the shops in our department, the teacher in charge of that particular shop takes over the group. The metalworking teachers do not "travel." They stay put and the students go.

Peter Yost demonstrating the repulsion coil he made in the Engineering Mechanics class.

The scope of manipulative operations that must be done by our academically gifted students in the Engineering Mechanics class will serve notice to those who think it is a course in brain work alone that they are wrong. The following list of operations will provide some notion of that scope:

Soldering; drilling wood, metal, and plastics; riveting; oxyacetylene welding; electric arc welding; resistance welding; tungsten inert-gas welding; tin-snip, shear and nibbler cutting; peening; tapping and cutting threads with dies; turning metal stock in lathe; turning wood stock in lathe; spinning metal; casting ferrous and

Kenneth Archipley welding parts for his project: hydraulic demonstration equipment.

nonferrous metal; sawing metal with hand tools and power tools; sawing wood with hand tools and power tools; planing wood; routing wood; finishing wood; heat-forming plastics; cementing plastics; fastening plastics; coloring plastics; operating standard material-testing equipment; operating standard automotive-testing equipment; operating standard electronic-testing equipment.

The student can apply the above operations in two ways in his shop work. He can incorporate such operations as are necessary when he makes a project, or he can practice the operations not necessary for a project on various materials that are available in the shop. Under either circumstance, he is expected to do all of them.

All of the projects that the boys do have to be devices that demonstrate some physical phenomenon, or the projects have to do with testing materials. The following list of suggested projects, along with simple sketches, is available to students to help them make their choices:

Acceleration apparatus; tensile-strength apparatus; independence of motion; action-reaction cart; inertia apparatus; Foucault pendulum; electric glass cutter; magnetic field about a solenoid; static-electricity demonstration unit; light source for optical bench; wire resonance in an a-c circuit; optical-illustion demonstration unit; pony brakes.

Reports Required

Students in this special class are also required to prepare technical reports because they will be an important part of their higher education in science or engineering. The report writing is started in the first semester of this course: One technical paper is required of everyone. Some of the topics covered, in the first semester this course was offered, were: "Instrumentation," "Nucleonics," "Structural Design," "Industrial Organization," "Bearings," "Lubricants," "Adhesives," and "Fasteners." A list of suggested topics is available to the youngsters, but the students can choose topics that are of special interest to them. To gather necessary data for these reports, students are urged to use available resources such as the faculty talent and facilities of the high school and the local junior college as well as local industry for sources of information. The student reports are graded for content, syntax, and word usage. These reports are assigned at the beginning of the semester. They are due one week before the end of the semester.

In addition to preparing a technical paper, each student is required to give an oral report on his topic. The use of charts and illustrations to dramatize the topic of the technical papers is encouraged.

Representatives of technical societies and industry address the class once a month. These people from the outside describe their specialized fields. During the first half of the past school year, the following topics were some discussed by the visitors: metal fabrication, wood products, synthetic materials, adhesives, abrasives, and history and development of aviation. In addition, field trips were made to a machine shop, a highly specialized manufacturing plant, an aviation institute, and a materials-testing laboratory.

When we planned this course, we felt the students would be able to carry a pretty stiff work load so we provided for weekly reading assignments. To encourage good work habits, a classroom quiz follows each assignment. Notetaking is required during all classroom discussions.

Allen Mullerbach and the static electricity machine built by him in the special course.

Lewis Long demonstrating the Galilee scale he made in the course for the talented.

guest-speaker presentations, movies, and filmstrip sessions. Periodically, the student notebooks are examined by the teachers, and a grade is assigned.

It should be apparent to you by now, that this is no ordinary shop class. Although the manipulative skills are taught to the students, they are also required to go one step farther in this particular shop experience: They are given experience in secondary research – digging out information from published sources and interviewing persons familiar with topics unfamiliar to students – and then in communicating their research findings orally as well as in written-report form. This sort of experience prepares them to meet the requirements they will all encounter once they get to college and begin preparing themselves for their careers in science and engineering.

And here endeth the first semester.

More to Come

Second-semester activities include preparation of the following papers by each student: a report on the size and quantity of material required to produce 300 units of the project he built in the shop; a list of tools and equipment needed to produce 300 units of the same project per week; the number of people and skills required to man a plant manufacturing the aforementioned units; a floor plan of the plant used for this hypothetical manufacturing venture (following standard drafting procedures); and a report estimating production costs of this operation.

The planning committee felt that the preparation of these reports would help make students aware of the problems of other fields related to the students' special interests.

The Engineering Mechanics course

(Continued on page 37)

For general students and for college-prep students

Two-Track Drafting Course

By William Beaumont
Oroville, California, High School

NINE years ago when I started making plans for teaching drafting, I developed a plan stressing "fundamental types of drawing." This was followed in the plan by "fields of drawing." The third and final phase was about "specialized drawing." A firm but fair code of discipline and classroom administration plus my program produced some fine drawing students. Ah, but that was nine years ago and time since then has changed things considerably.

Four years later, our school counselor and I did some thinking about the problems developing out of the expanding mechanical-drawing courses in our high school. I devoted my summer that year, 1955, to devising an entirely different approach to teaching mechanical drawing. Changes were made.

Substantially, the changes that were made evolved from the following:

1. College-preparatory students wanted more than an ordinary mechanical-drawing course, in name as well as in content.

2. Noncollege-bound students were weary of wrestling with more advanced, precollege drawing assignments. They wanted practical work, work of more immediate value to them.

3. Colleges and universities of engineering were passing the word around that a minimum of one year of high-school mechanical drawing was required of freshmen entering their schools.

4. A new industrial technology was starting to need draftsmen trained in schematic, statistical, and production-illustration drawing.

5. More college conscious students were being programmed – more parental than counselor directed – into drawing to prepare them for college.

6. Some students were not able to keep up with an accelerated program designed for college-prep boys, so they were unhappy and making poor grades.

It was obvious to us that a new approach was needed. Equally obvious was the way for us to solve our problem: divide the subject matter of mechanical drawing right down the middle into two teaching areas. We called one side Engineering Drawing, and the other side became known as Shop Drawing.

It was decided that Engineering Drawing would follow pretty much along the lines of the accelerated program we had been teaching college-prep students. The course was intensified and covered all aspects of drawing needed to prepare students for their collegiate careers in engineering, science, industrial-arts teaching, or to become a professional draftsman.

The Shop Drawing, it was planned, would include an expanded program concentrating primarily on shop-drawing practices and procedures. The course would relate itself to similar object experiences in drawings and shop projects. It would try, furthermore, to coordinate the drawing class with work in the shop.

At the start of each fall, both Engineering Drawing and Shop Drawing were to start off with the same fundamental practices and techniques but shortly afterwards they would part company, each going its own peculiar and special way.

That was what we did in 1955, and here is how we did it.

To split the course was a matter of mechanics. How to correctly divide the students into the two groups was an altogether different matter. We had to consider several factors about the boys when we made our decisions. Some of these factors were: pretests, diagnostic studies, intelligence tests, a trial period, or grouping according to the student's choice of high-school course. Students taking college-prep courses more often than not ended up in the Engineering Drawing class, while those who took noncollege-preparatory work generally wound up in the Shop Drawing class. Anybody taking shop drawing, however, who showed promise and interest was allowed to switch over to Engineering Drawing.

Now here is what they were taught. We'll take Engineering Drawing first.

Engineering Drawing I. Fundamental Types of Drawing. – For beginning students who need to understand the types of mechanical drawings which are fundamental to beginning work encountered in college. Particular emphasis is placed on American Standards Association drawing practices, pencil technique, and lettering.

First Semester. – Lettering: upper case, use of guide lines, and proper line weight. Instrument Drawing: exercise assignments to accustom the student to the T-square, triangles, protractor, scale, dividers, and compass. Dimensioning Practices: exercise assignments to familiarize the student with American Standard Association dimensioning practices for continuous use. Geometric Drawing: geometric construction exercise assignments are given with related practice problems similar in scope to those the students will encounter later. Sketching: some elementary principles of free-hand drawing primarily encountered in lectures and assignment preparation. Orthographic Drawing: covers layout and projection of multiviews.

Second Semester. – Section Drawing: covers full, half, offset, revolved, and removed sections. Working Drawings: detail drawings with particular attention to notes and specifications. Reproduction Drawings: making drawings for reproduction by blueprinting or diazo printing. Auxiliary Drawing: covers front, top, and side single auxiliaries. Pictorial Drawings:

(*Continued on page* 32)

The "Omega" universal dividing head, tailstock, collet adaptor, and set of index plates. The tooling illustrated in this and subsequent articles was used in the production of this machine-tool accessory.

Teaching creativity in the machine shop

Production Planning a Project (Part One: Fixtures)

By H. J. Gerber
Head, Machine-Shop Department, Oklahoma State University, Stillwater

TECHNICIANS employed in the metalworking industries are increasingly being asked to take over many of the routine duties traditionally performed by engineers. Such an upgrading procedure is certain to mean that the technician who wishes to make maximum progress in his field must be willing and able to cope with many problem-solving situations on the production level. To perform duties of this kind adequately, it is important that students in technical and trade courses be exposed to some type of training for solving production problems while they are in school.

Most technicians graduated from our department in recent years are holding responsible positions where they are doing such things as designing or building production tooling, designing and building scientific instruments, and planning production processes. Some are now shop superintendents carrying the responsibility for frequent application of personal judgment. We like to think that success of this kind is at least partly due to the fact that while in school they were given the opportunity to collaborate in solving laboratory and class problems which were genuinely challenging.

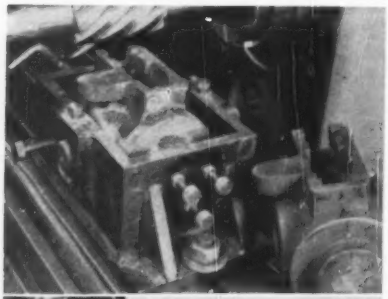
It is with these thoughts in mind that we have continued to orient the construction of our courses in this field around two educational principles:

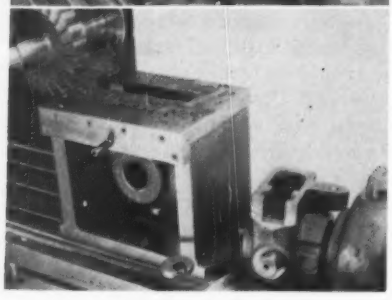
1. Training should take place in a situation where there is reality of both purpose and practice. If these conditions can closely approximate reality, they can be strong contributing factors toward developing a climate of creativity. In short: make use of an *actual* rather than a *simulated* setting.

2. There is no learning without motivation of the learner, and the learner must have a definite purpose for success in learning. Motivation, to be most effective, must be the kind the psychologists refer to as "intrinsic." That is, an activity which gives a person satisfaction by contributing to the successful solution of a problem whose solution has a useful purpose, or to a task of useful construction.

To put these principles into practice in the classroom and the shop-laboratory, we have been following the procedure of integrating the objectives of our advanced machine-tool and related courses. This has been done largely through a judicious

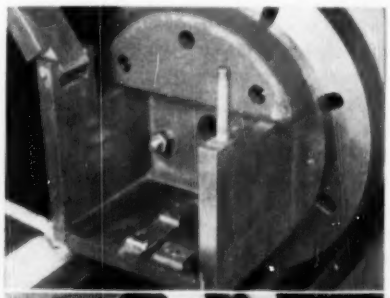
Top photo: box fixture to position and hold the main-housing casting for the first milling operation. Locators permit the casting to be positioned and locked in place, ready for machining, in less than one minute. Bottom photo: second-operation milling fixture. An accurate slot is milled in the top opening of the housing. The casting is located upward against the top of the fixture to insure squareness with the previously finished top surface of a milled main-housing casting.

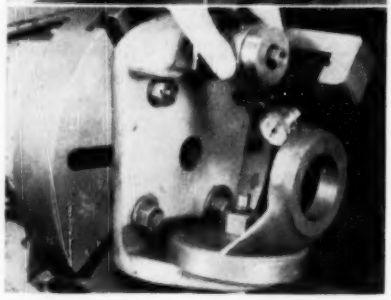


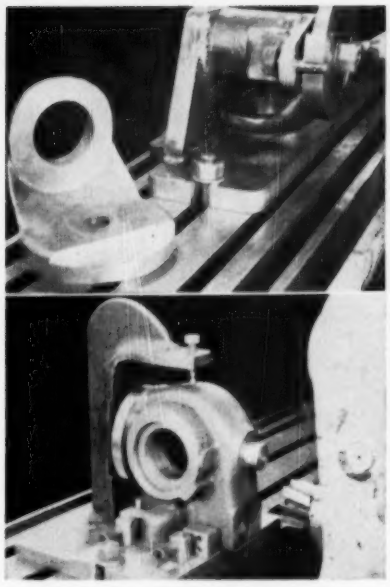


Top photo: boring and facing fixture for the housing. This fixture is mounted on the faceplate of an engine lathe. It is a multi-purpose fixture because the housing is bored for the spindle bearings, and faced. Then the casting is repositioned at 90° to the original setting to face and turn the trunnion seat. Note the hardened and ground tool-steel locators on the inside bottom surface. These position the casting in the slot milled as in the bottom photo in column one of this page. The counterweight at the top is for proper balance while rotating. Bottom photo: lathe fixture for boring, facing, and back-facing. Note the built-in inspection gage to aid the operator when he back-faces the inner seating to a close tolerance dimension from the rotational center of the base of this piece. The arm holding the dial is mounted on ball bearings.

Bottom photo courtesy of *The Tool Engineer*



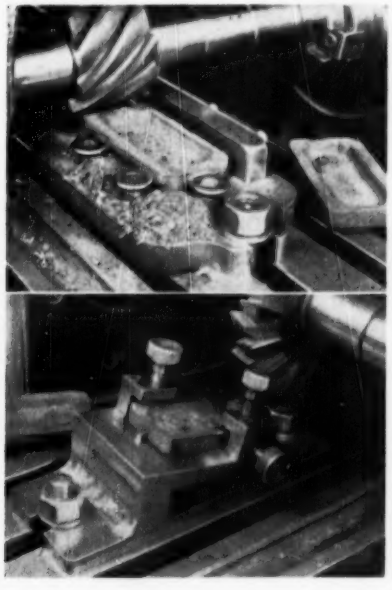




Top photo: knee casting held in fixture for end milling of two "T" bolt openings in base. After the first opening is milled, the casting is rotated 180°; locating pin (front) is placed in this milled slot and second slot is milled in like manner. Bottom photo: face-milling fixture for the housing and housing cover plate. This fixture holds two castings just as they will be assembled so that both pieces are milled to the exact plane.

choice of projects so that students in each of the courses can contribute to the ultimate completion of the project. Students in each different course

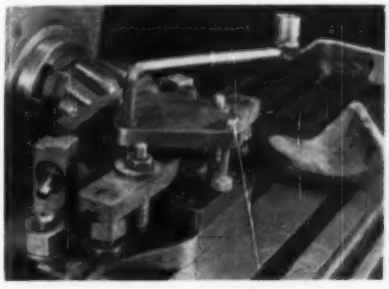
Top photo: first-operation fixture on housing cover plate. Note the circular knife-edge locators which grip this thin casting to prevent it being lifted off its locators during machining. Surface, which mates to top of housing, is being slab milled. Bottom photo: fixture to hold the cover plate for the milling of a 12° angular slot in the bottom side of the piece. This opening is critical because it controls the tilt movement of the worm shaft when it is disengaged.



plan and execute tasks which are within the specific area in which that class is engaged.

During the past 12 years we have made use of a series of machine-tool building projects as the instructional vehicles for our classes in this two-year terminal curriculum. These projects are particularly designed for the courses in tool design, planning of production processes, production machine shop, and toolmaking. It is my policy to introduce a fresh project each year, although on some of the more ambitious ones, such as a bench engine lathe, the planning of all processes and tooling has proved to be a two-year or three-year task.

Annual change of projects is desirable so that thinking, by both students and teacher, does not become stereotyped. A recently completed project, one which has engendered a high degree of student enthusiasm, is described and illustrated, along with

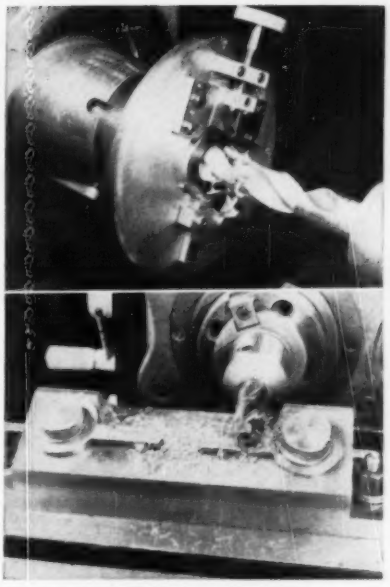


This fixture holds the auxiliary trunnion-support casting for face milling of its base.

student created solutions to many of its production problems, in this and two succeeding articles.

Students in my machine-tool classes suggested the development of a small, precision, universal dividing head to complement the small milling machine built earlier in the shop classes. The dividing head was then designed, patterns made, and castings poured in our foundry. A handmade prototype was then built in the machine-shop classes for testing. After two complete model changes, a satisfactory design was completed, and the project was submitted to classes in production planning to permit those students to set up conditions for manufacturing the machine in quantity. This planning involved a detailed study and discussion of each component part to decide which basic machine-tool processes were ultimately necessary to manufacture it.

Such planning involves an intimate knowledge of the functions and limi-

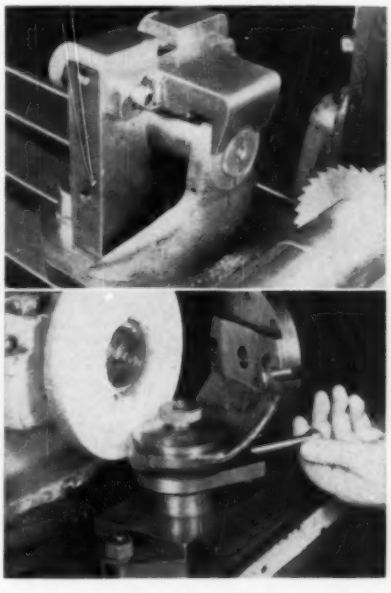


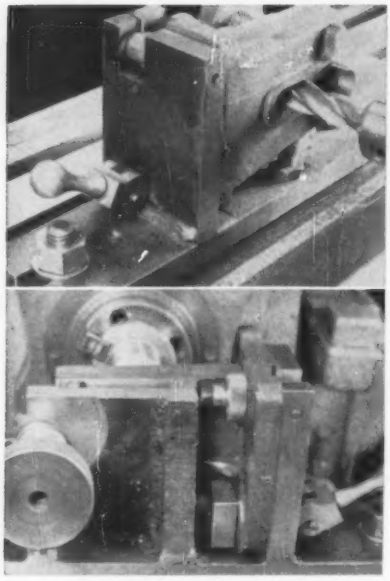
Top photo courtesy of *The Tool Engineer*

Top photo: fixture to hold and position sector-arm blank for drilling, boring, and facing. Bottom photo: bevel-milling fixture for sector arms. It holds a matched pair of arms — for milling the bevel on blades.

tations of standard machine tools as well as the extent of the machinery and standard tooling available in our laboratory. Each student in this class is required to submit a term report on his study of alternate possibilities which might be practical for the proc-

Top photo: a slitting fixture for the auxiliary trunnion support. This fixture has a movable locator to compensate for the tolerance range between the trunnion-hole center and the base surface of various pieces in a batch. Bottom photo: radius-grinding fixture for finishing seat for a vernier scale on the knee casting. This fixture is mounted on a tool and cutter grinder for this operation.





Top photo: milling fixture for slot in the tailstock. Casting is clamped against location surfaces at three points by a quick-acting clamp. Bottom photo: rear view of above.

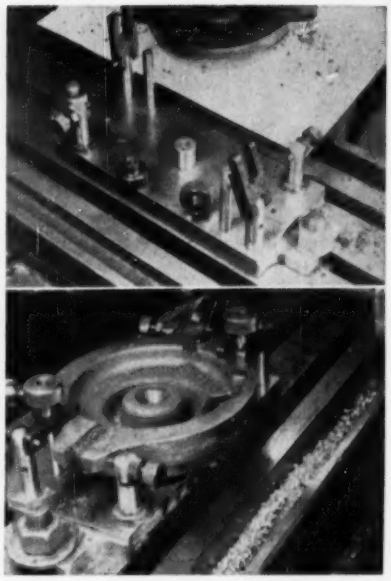
essing of several components of the machine.

From written reports of these studies, and accompanying set-up sketches, the detailed designs for fixtures, jigs, press dies, and many types of special devices are developed by the classes in tool design. This is done on an individual basis. Each student chooses, or may be assigned, a problem for which he designs the complete tooling for one or more machining operations.

Assembly and detail drawings for the tooling are submitted to the machine-tool classes specializing in tool and die making. The tools are then built and tested through a small pilot run of parts.

A high degree of class interest prevails if students can become fascinated by a problem. Often students who have participated in production planning and tooling a project will, a year or so later, visit our machine shop to see for themselves how their creative effort is succeeding in the completion of the end product for which it was designed.

As teachers, we all agree that we want to teach students to think. It seems to me that to accomplish this we must assist students by providing situations which will require the use of brain power rather than merely memory or "motor skills." The project, therefore, must involve a series of challenging conditions. It cannot be as simple as, for instance, a center punch. Personally, I am not enthusiastic about the motivation possibilities in making art objects such as salt and pepper shakers, etc., in any machine-shop class. These are better suited to the purposes of an arts and crafts class. The very name "machine shop" denotes a place where machines are made as well as used.



Top photo: milling fixture for machining alignment keyways in the rotary base. Bottom photo: above fixture with workpiece.

Incidentally, I firmly believe that teaching creative thinking and problem-solving skills knows no boundaries. It is, in my opinion, as valid an objective in the field of industrial arts as it is for vocational and technical curriculums. Our metalworking specialists in industrial-arts education usually enrol in the same classes with technicians to participate in these creative activities. They often prove to be leaders in developing ingenious tooling and machining methods.

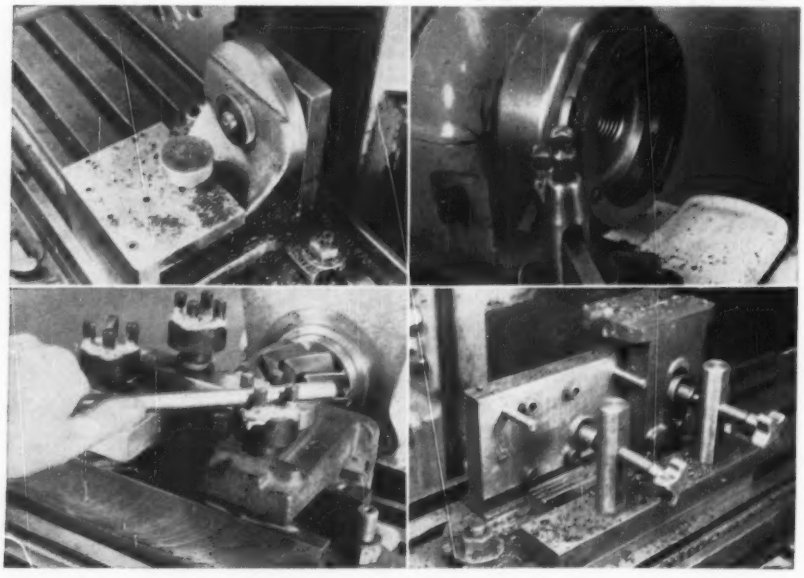
This dividing-head project has proved to be one of the most interesting we have used. This interest may be due largely to the complexity of operations and degree of precision required for all of the parts as well as in the completed assembly. I might mention at this point that, to obtain maximum effect in achieving a "real" setting, we have trademarked our machines just as is done in industry. The name "Omega" was selected, and it now appears on all of our student-built machines.

The production tooling illustrated in this article is of that type classed as "fixtures." A fixture in the machine shop is defined as a "special work-holding tool which has been custom designed for single-purpose use." It is used to adapt a standard machine tool to economical and accurate production of duplicate parts. The illustrated fixtures were all de-

(*Continued on page* 35)

Top-left photo: fixture for milling seat for the auxiliary-trunnion support in the knee casting. This is a critical operation because this seat must be perfectly square with the tilt axis as well as to close dimensional accuracy for the proper functioning of the assembly. Top-right photo: lathe fixture for turning inside and outside radiuses of eight "T" bolts. Two of these bolts are used on each assembly to fit into a circular "T" slot in the rotary base of the dividing head. Bottom-left photo: face-milling fixture for base surface of the tailstock casting. The fixture holds two workpieces. Bottom-right photo: fixture to aid in milling the alignment keyways in the base surface of the tailstock. One station is unloaded.

Top-right photo courtesy of *The Tool Engineer*



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- **Gripping Power**
  Model 50 is made for heavy duty turning. It has tremendous gripping power.
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  Always parallel Model 50 Rubber-Flex collet jaws permit chucking of tubing and fragile materials without crimping or scoring.
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  The 10 Rubber-Flex collets in the 500 Series, developed especially for use with Model 50, cover a greater bar stock range than 63 old-fashioned steel collets. You can chuck any bar between 3/32" and 1-1/16" with this set of 10 collets.
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  Model 50 adapters are fully machined for immediate mounting. Available in all popular threads and American Standard L00 taper.
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Jacobs CHUCKS

The Jacobs Manufacturing Co., West Hartford 10, Conn

This man might have been a member of the feared Mau Mau, but his idle hands and idle mind have been put to work in school.

Once the center for Mau Mau terrorists, now it is

Kenya: A Challenge to Industrial-Arts Education

By Thomas J. Brennan

Department of Industrial Arts, West Virginia University, Morgantown; formerly ICA representative in Kenya

(Editor's Note: The author did his work at the following schools in Kenya: the Siriba Teacher Training College at Maseno in Nyanza Province, which is 14 miles from Kisumu on the shores of Lake Victoria in the northwest corner of the country and just a few miles from the home of Tom Mboya, who figures prominently in daily dispatches from Africa: and at Kagumo Teacher Training College, in the Central province, four miles from Nyeri, White Highlands.)

INDUSTRIAL-ARTS education has a great challenge and an unparalleled opportunity for service today in East Africa!

Six years ago, Kenya, the hub of East Africa, which is comprised of Tanganyika, Uganda, and Kenya, blazed into prominence because of Mau Mau uprisings. Hundreds of newspapers and magazines reported the bloody details of that rebellion. Today, East Africa is still much in the news with its continued struggle for national recognition.

If such an unhappy situation as Mau Mau could have a beneficial outcome, it would probably be the effect the uprising has had on the educational pattern in the colony. Prior to 1952, those East Africans who were fortunate enough to have been given an education past the primary school had been sent to purely academic intermediate and secondary schools. Also, until this time, all of those who could assimilate such an education found ready employment in either the government, education, or the railroad. By 1952, though, these services had absorbed all of the educated Africans they could with the result that there was rather widespread unemployment. The educated African no longer wanted to stay on the farm, the backbone of native economy. He congregated in the cities which were his best source of employment. He became a ready target for unscrupulous politicians, and he was easily recruited into the secret Mau Mau organization. As a Mau Mau, he was able to live by robbery while he gave vent to his dissatisfaction.

When the uprising was finally quelled it was evident that the educational pattern had to be altered.

Academic education had come to be looked on almost with reverence. Trade schools could recruit only those students too poor to succeed in academic subjects. In a multiracial society, which is extremely class conscious, this placed trade-school students in a very low position. For years the only people who worked with their hands were the ignorant natives who labored for the European settlers and the Indian Sikhs who were in a class by themselves.

The trade school produced a medi-

The exterior of a shop in Kenya. The brick is handmade and fired in native-built kilns. Terra cotta tiles for the roof were made elsewhere. Availability of electricity is uncertain.

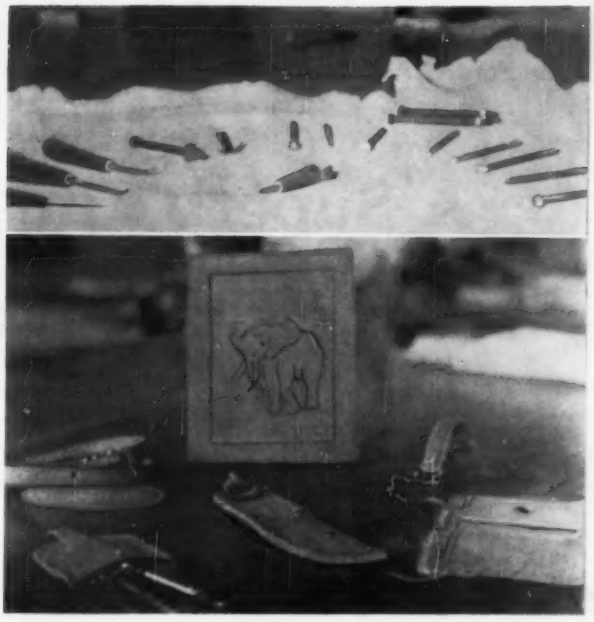
ocre product not really interested in work. Students who could not complete trade-school work were sent out as low-grade teachers in primary and intermediate schools. Most often they taught handicrafts, the Kenyan equivalent to industrial arts. With such a teacher, it was obvious that handicrafts would never attain status.

The handicraft program was appalling. It consisted almost entirely of woodwork in a land of rapidly dwindling wood resources. Work was limited to exercises requiring students to make a series of joints. When wood was not available students engaged in sisal weaving, a craft every African learns from infancy. It was a common sight to visit a school and find joints piled from floor to ceiling in the workshop while the current students were making more joints. In their low economic status there was a dire need for simple pieces of furniture; yet it never occurred to the teacher to put the joint to work in a simple stool. He was content to act as the school *fundi* (the Swahili word for workman). He was poorly qualified for even this undertaking. The only teacher-training program in handicrafts in the colony was seriously hindered from doing an effective job because it could not recruit desirable students.

Those who had the academic ability would not take the course, and the better trade-school students stayed in the trade for it meant they could live on a much higher social and economic plane than the school *fundi*.

The Kenya Education Department asked for technical assistance from the International Cooperation Administration and a cooperative scheme was devised. An American technician was assigned to the project along with a very well-qualified English handicraft instructor. An adequate budget for a two-year project was placed at their disposal. They were charged with the responsibility of developing a teacher-training program which would attract able students as well as help to alleviate the stigma attached to "working with the hands."

The problem was surveyed and a tentative program was started. The curriculum was completely revised. The home crafts, which had almost been forgotten, were included in the scheme of work by devising attractive and utilitarian projects. The use of wood, although not excluded, was limited to a few projects which could readily find use in the home or could be sold. Since all liquids imported into the colony arrived in five-gallon tins, which were universally available, a tin-can, metalwork program was devised. Simple kerosene lamps, measuring cups (used in trading), simple home implements, etc., were included in the scheme.



A set of tools (top photo left) each student makes for himself. They were fashioned from nuts and bolts (right) or 12d nails. Samples (lower photo) of students' work made of leather.

The African economy is closely allied with the possession of livestock. All important economic transactions are made by exchanging cattle, goats, or sheep. Hides are plentiful and cheap, but they are air dried and stiff. Through the cooperation of the Hides and Skins Department of the Kenya government, a rural tannery was established. Students were taught tanning methods using only the simplest types of tanning materials readily available. More than a hundred African trees and shrubs contain tannin in their barks. Fleshing knives were fashioned from salvaged automobile parts. Leatherwork training proved extremely popular and did much to attract students to the program. Articles for personal and home use were made the backbone of the leatherwork scheme for work.

This kiln is believed to be the only muffle-type kiln in Kenya. The bricks were hand made, and the entire construction was done by students. Furthermore, kiln's wood-fired.

There is a large amount of poor quality clay in the soil of Kenya. For centuries African women made unglazed cooking vessels and fired them in open grass fires. Simple wood-fired kilns were designed which could be rebuilt each time the wares were salt glazed. Experimentation was started to develop simple glazes utilizing easily obtainable materials. Basketry, weaving, and other indigenous crafts were refined. Simple equipment was devised to utilize the raw material more efficiently. These crafts were included in the new curriculum and taught to the teacher trainees. For teachers already in the field, refresher courses were started to upgrade them. Incentive pay helped in their recruitment and made selection possible.

While this program is still in its infancy, and the first group of teachers has been in the field only one year, there is some evidence of partial success. Some of the better students in the intermediate schools have been attracted to the program and selection is becoming possible. Another

(*Continued on page* 38)

The winner of 11 Outstanding Achievement Awards in the Ford IAA program gives the secret of his success

A Superb Finish Means Hard Work

By David A. Rigsby

Supervisor of Industrial Arts, School of Education, The Woman's College, University of North Carolina, Greensboro

This lad is learning what it takes to get an excellent finish on his wood cabinet.

THERE is no secret to finishing wood, but there is a recipe: blend great amounts of sand papering with equal quantities of rubbing down of coats of finish, specially the last, and spike well with patience.

Before you start to finish any project, though, you must first decide whether to use a lacquer or a penetrating finish. The lacquer is sprayed and the penetrating finish is applied with a cloth. Generally, we use a lacquer on good pieces.

Properly prepared surfaces are absolutely necessary to take a good finish, and proper preparation means sanding, and lots of it. We do almost all of our sanding by hand. Small amounts of machine sanding will not damage a surface or impair preparation, but it is our feeling that a good piece of wood work is worth sanding entirely by hand.

Garnet paper, though a little more costly than other kinds, is more efficient. Start your sanding with ½ or 60 grit. Cut away all defects and smooth the surface. As you progress to finer papers, all that is left is to sand out the scratches left by the heavier paper.

A paper progression that we follow is: Start with ½ or 60 grit; go to 0 or 80 grit; then to 3/0 or 120 grit. All sharp corners should be rounded slightly with the 3/0, and, for an extra fine surface finish off with 6/0. Never use steel wool on bare wood. We use a nonfiber-lifting stain for any coloring although a number of our projects are finished without stains. The stain is followed by a coat of lacquer sealer or sanding sealer. The sealer is then rubbed down with 000 steel wool or 6/0 finishing paper. We have had excellent results by limiting use of paper to flat surfaces and steel wool to turnings, corners, and mouldings. Do not use a sand block. The hand is much better.

Excellent finishes like the one at left are not out of reach of even young shop students. This cabinet was made by a ninth-grade boy.

We use paste wood filler on open-grain woods such as walnut or mahogany. We omit filler from finishing close-grain woods such as cherry, white pine, maple, or birch. Filler is best used after the first coat of sanding sealer has been rubbed down.

The filler should be followed by another coat of sanding sealer. If we do not use filler, we still apply a second coat of sanding sealer on top of the first coat after it has been rubbed down. The last coat of sanding sealer in all cases must be thoroughly rubbed down with 6/0 finish paper or 000 steel wool.

Now comes the lacquer. Any good grade of wood lacquer will do. We mix the brand we use with one-half flat lacquer and one-half clear gloss lacquer. (It would be well for you to experiment a little to develop a lac-

(Continued on page 37)

"Built-in Extras" make

DURO POWER TOOLS

the most desired line in schools everywhere!

Scroll Saws

Jointers

Sanders

Band Saws

Routers

Lathes

Drill Presses

Circular Saws

- **extra work areas**
- **extra capacities**
- **extra safety features**
- **extra ruggedness**

Progressive school administrators are equipping their vocational workshops with Duro Power Tools. The reasons for this preference are many and varied—but it can be boiled down to three simple words—"more for less"! You need just glance at a Duro unit to see the many extras you get at no extra cost! Here are just a few: *Circular Saws* have larger tables, greater depth of cut at 45° and 90°, added work space . . . PLUS . . . *Drill Presses* with more capacity and stroke feed, a built-in light and switch . . . PLUS . . . *Lathes* offer 2" greater swing over bed, handwheels for tail stock and tool rest holder . . . PLUS . . . *Band Saws*, too, have 2" more capacity under foot, 104" blade, table extensions and light attachment . . . PLUS! . . . *Belt and Disc Sanders* with miter gauge included, quick belt release, extra large platen size . . . PLUS . . .

These extras are only a few of the many found on the entire Duro line . . . extras not found on other nationally advertised power tools.

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Concentrating in fewer areas leads to

Automotive Instruction in Depth

By Jon P. Adams and Arthur J. Oettmeier

Dean of Trade and Industrial Division and Coordinator of Automotive Department, Ferris Institute, Big Rapids, Michigan, respectively

AUTOMOTIVE instruction should be geared to meet educational needs at three different levels: first, the industrial-arts level; second, the car-owner level; and, third, the vocational-technical level.

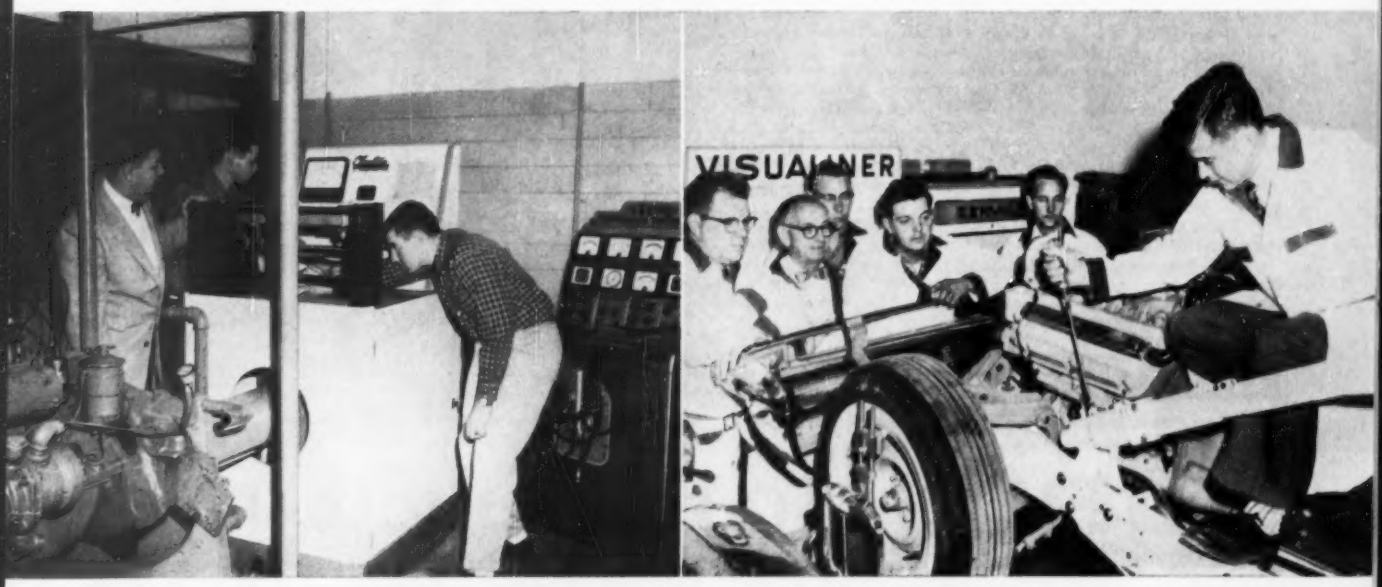
At the industrial-arts level, automotive instruction can be part of a small, general-shop program or, in the case of larger schools, it can be a unit of instruction in a unit shop. In either case, however, instruction must meet the needs and objectives of industrial arts.

At the car-owner level, instruction should be complete enough to help car buyers make intelligent automobile purchases and to help the owner understand service and maintenance problems and procedures. The objectives at this level are to help the owner know how and when to insist on proper care of his vehicle – and *why* – as well as assist him in spending his car money more wisely to add trouble-free miles to his driving.

At the vocational-technical level, automotive instruction can, in some instances, be done successfully in the eleventh grade and twelfth grade. Vocational-technical automotive instruction in high school must be supported by a strong industrial-arts program. Too many schools are still using automotive programs – and other teaching programs in industrial education also as "dumping grounds" for undesirable, incompetent students and other types of educational misfits. If a student is incapable of handling other subjects, does it seem reasonable to assume he can learn auto mechanics at the vocational-technical level? The answer is obvious. Ironically, many of the same people who are responsible for dumping educational misfits, undesirables, and incompetents into auto mechanics are the very same people who annually spend scads of money for unreliable auto servicing and then while away many of *their* so-called "productive hours" grousing about the lunkheads who goofed up the last grease job, valve job, or what have you at the local garage.

The graduate of a vocational-tech-

Checking the results of a rebuilt engine (left) with a dynamometer and making a steering adjustment (right) are two "must" skills.



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John Bendix, Assistant Professor
Industrial Education Department
Western Michigan University

CLAUSING 6300-Series 12¾" LATHES "are the best values for school shops"

The above statement typifies the high regard in which CLAUSING lathes are held by instructors everywhere. Here are a few of the reasons why:

● **Totally enclosed headstock, apron and quick-change** . . . inquiring fingers can't get into these danger zones. Neither can dirt or chips.

● **All gears and shafts travel in a bath of oil.**

● **All gears are shaved** . . . for smoother, quieter operation and greater accuracy.

● **All controls are located outside the machine** . . . including those for back gear engagement.

● **Tapered key-lock spindle nose** . . . eliminates danger of chuck run-off on braking or reversing.

● **Flame hardened bed ways are standard equipment . . . at no extra cost.**

● **Forged steel spindle turns on Timken "Zero-Precision" roller bearings.**

● **Apron and quick-change gears are protected by safety devices.**

● **Lead screw has easy-to-replace shear pin.**

● **No exposed belts or pulleys** . . . drive is underneath. Has heavy-duty ball bearing countershaft. Two V-belts drive the spindle.

● **Spindle belts are outboard for easy replacement.**

Get complete details . . . make any comparisons you wish. We know you'll agree that CLAUSING 6300-series lathes are the finest for instructional use . . . the greatest values and the best selection that could possibly be made for your shop. Write for literature today.

CONDENSED SPECIFICATIONS

Swing over bed	12¾"
Between centers	21½", 33½", 47"
Hole thru spindle	1⅜"
Thread range	54 selections, 4 to 224 Standard right or left
Motor recommended	1 or 1-½HP, 1 or 2 speed

Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.

Quick-change box, too, is totally enclosed and gears and shafts turn in bath of oil . . . another important safety and long-service-life feature exclusive wh Clausing in lathes of its class.

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nical program must be competent to be employable in the automotive-service industry. Auto dealers and garage owners are constantly seeking men who can do service functions at the technical level. Dealers and garage owners are justified in demanding men with this level of training. They are in business for keeps. They are not in business to provide "graduate" training for partially trained employes. Their customers' cars are not "practice cars."

It is not unreasonable to assume, therefore, that the graduate of a vocational-technical program must be a competent person the moment he leaves school to work in the automotive-service industry. The question arises, then, "What must this graduate know?"

Analysis of the automobile answers this question. Instruction could start with door-latch failure, ignition failure, carburetion failure, or any of the multitude of small complaints car owners make daily to their dealers or servicemen. Car owners are unhappy, too, when heaters do not work, air-conditioning units fail, or when their lives are jeopardized because of faulty brakes and steering units. Automotive-service instruction must include vital related information in mathematics and science. Some of the elements of related instruction are noted in the accompanying chart.

Science and Technical Knowledge	Laboratory Experience
Brake Service	
Study of hydraulics as it pertains to the transmission of power	Service an automobile
Study of the laws of levers	Hydraulic brake system
Study of ratios and pressures	Bleeding a hydraulic brake system
Study of expansion and contraction rates of metals	Turn and grind brake drums
Study of stretch characteristics of metals	Reline brake shoes
	Contour brake shoes
	Service a parking-brake system
	Recondition the various power-brake systems
Engine Service	
Study of gearing, stresses and strains, and pressures	Recondition an engine
Study of precision measuring instruments	Perform service procedures prescribed by manufacturers
Study of mathematics and the relationship to horsepower and torque	Perform clutch service
Study of expansion and contraction rates of metals	Perform engine accessory service
Study of the laws of levers, electricity, and fuel	
Steering Service	
Study of geometric principles	Align and balance the ball-joint suspension
Study of static and dynamic balance	Align and balance the torsion-bar suspension
Study of hydraulics as it pertains to the transmission of power and motion	Recondition power-steering systems
Study of ratios and pressures	
Driveline Service	
Study of the laws of levers	Recondition the various automatic transmissions and driveline units
Study of fluid couplings and hydraulic controls and mechanisms	Recondition the rear-axle assembly of popular automobiles
Study of precision and special tools and their principles of operation pertaining to driveline assemblies	
Study of the various methods of harnessing hydraulic control units to develop various speed and power ratios.	
Electrical Service	
Study of magnetism and electromagnetism	Tune a variety of engines using the typical tune-up equipment including:
Study of electrical laws	battery capacity testers
Study of instrumentation	generator regulator testers
Study of electrical circuits	combustion analyzers
Study of transistor circuits	oscilloscopes
Study of electrolysis and voltaic cells	cylinder leakage testers
Study of magnetic induction	master motor testers
	distributor testers
Fuel-System Service	
Study of high-pressure vs. low-pressure areas	Service the various single-, double-, and four-barrel carburetors
Study of air-fuel ratio	Test fuel pumps for low and high pressures as well as volume
Study of fuel characteristics	Test carburetors with the various instruments made for this purpose
Study of preignition and detonation of fuels	

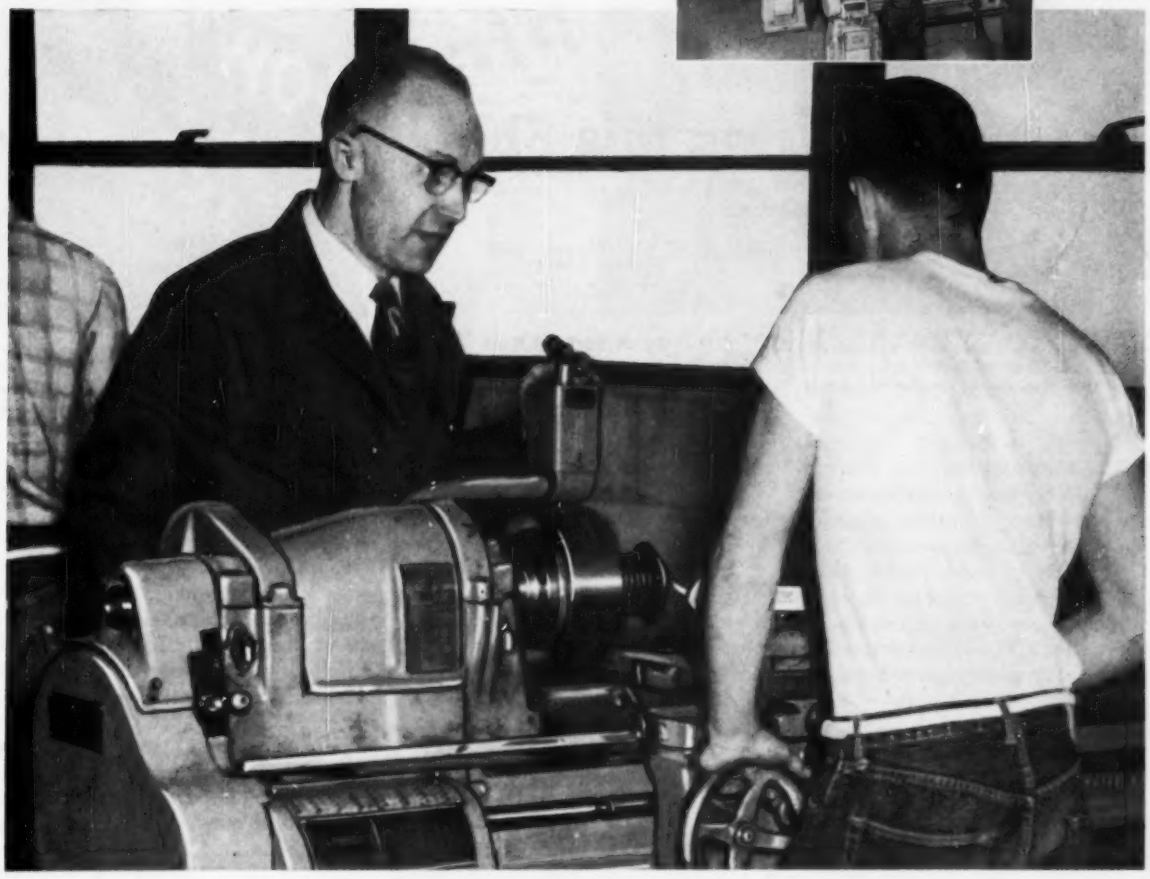
It is pathetic to "dump" students into a program demanding ability to absorb technical information based on scientific principles which demand a mathematics and science background for learning and understanding. Factory schools and technical-training centers are modern, up-to-date laboratories. The equipment is first rate. Students attending these centers receive specialized instruction, and they have a foundation in fundamentals learned either in a school or on the job.

The above are what make high-school automotive instruction a great challenge as well as a serious problem. Many high schools try to cover the area in breadth rather than depth. Because equipment for an auto shop is so expensive, it seems wiser to narrow the field of instruction to one or two areas of instruction and to dig deep enough in study for the student to learn enough to make him employable, rather than to try a broad approach. Some of the areas that can be developed in an automotive-instruction program, those that can be taught in depth, are: heavy repair, ignition and carburetion, front-end alignment and brakes, driveline, and transmission.

Once the student gets on a job, there are many special schools he can attend to increase his knowledge and skill. By limiting the instructional area on the secondary level, better equipment, and more of it, can be purchased. In contrast, the traditional approach to automotive instruction – the broad approach – demands so much equipment that very often shops are inadequately equipped.

The new approach—in depth for a limited number of cases—would make simpler the standardization of courses, to agree with those taught elsewhere, and coordination with latest industry practices. This approach coupled with summer conferences to up-date courses would elevate in general the degree of competency students could achieve, thus enhancing their chances greatly for employability immediately after graduation. ★

Glenwood High School, Canton, Ohio
J. D. Custis
Metal Shop Instructor



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"I chose South Bend Lathes for our shop in this fine new school... they are easier to live with as an instructor. More simple, direct teaching is possible with South Bend Lathes than with some complicated or 'gadgety' designs. The student can easily see why and how each control does what it is intended to do, and, because they are so well built, I do not spend a lot of time on maintenance."

Mr. Custis's comments point out why countless shop instructors have preferred "to live with" South Bend Lathes. You, also, can make your teaching easier by using these school-proven lathes. Let us tell you more about them—please write.

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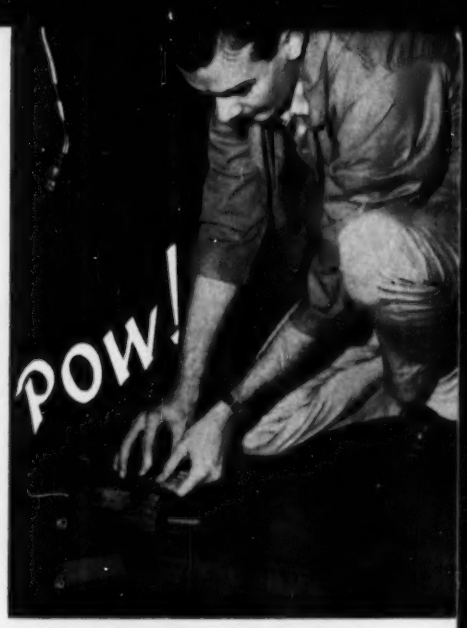
Builders of lathes, milling machines, shapers, drill presses, pedestal grinders.

SOUTH BEND LATHE

Latecomers to Mr. Culpepper's electronics classes at SIU are greeted by a loud bell when they break a photoelectric relay mounted near the door as they enter the room.

All's a-poppin' in this Shop

By Albert Meyer
Southern Illinois University, Carbondale



Student Assistant Leroy Frazier at Southern Illinois University loading a detonating device with a firecracker. The unwary beware! Just about anything can happen in this shop.

TEACHING and learning electronics can be fun – a circus if you please – if there is some imagination in the instructional approach.

That is the premise under which Fred Culpepper, Jr., instructor of industrial education at Southern Illinois University, Carbondale, operates in training teachers for junior-high and senior-high schools. Consequently, he places nearly as much attention on methods of presenting electronics information as on the technical content of the courses themselves.

The idea is put into practice in the university's electronics laboratory where Mr. Culpepper continually stimulates his students to plan and to work out demonstrations and teaching aids illustrating the basic facts of electronics and their application. His industrial-education laboratory is different from most laboratories around the country used for teaching electronics.

SIU Industrial-Education Instructor Fred Culpepper (left) demonstrating to Leroy Frazier the use of a Tesla coil made as a class project by one of the students. The Tesla coil is used to teach basic television circuitry. When Frazier turns on the switch of the high-voltage generator, a corona discharge lights the unconnected neon tube in the instructor's hand.

Surprises await the unwary or the inattentive student in Culpepper's classes. They are surprises which may furnish a bit of merriment, but they really serve as object lessons which can be used in the high-school classroom to arouse interest and encourage students to dig into the literature of electronics and electricity in search of ideas and devices that may be used in the home or in the workshop.

The latecomer to Mr. Culpepper's class may have his arrival announced by a raucous buzzing. Why? He has unwittingly broken a beam of a photoelectric relay placed at the classroom door.

The unwary visitor, seeing a coin lying on the floor, may have his acquisitive desires made known by a ringing bell when he stoops to pick it up. Why? The coin is fastened to the floor, and it is connected to a capacitive relay circuit.

These devices, Mr. Culpepper points out, demonstrate to his students a practical use of such circuits for a burglar-alarm system.

Lectures and demonstrations should be planned to make a lasting impression on the student, Mr. Culpepper says. The lecture area at the front of his laboratory is arranged to make the most of demonstrations. An array of hidden foot switches under the

lecture table are used to enliven the session as well as to enable the instructor to turn on equipment and start demonstrations without fumbling with switches on the table's surface.

The room may be darkened for projection purposes while the blackboard is illuminated by its own lighting system. Spotlights are arranged above the lecture table to illuminate any necessary demonstration that may be conducted in connection with the films or filmstrips being projected.

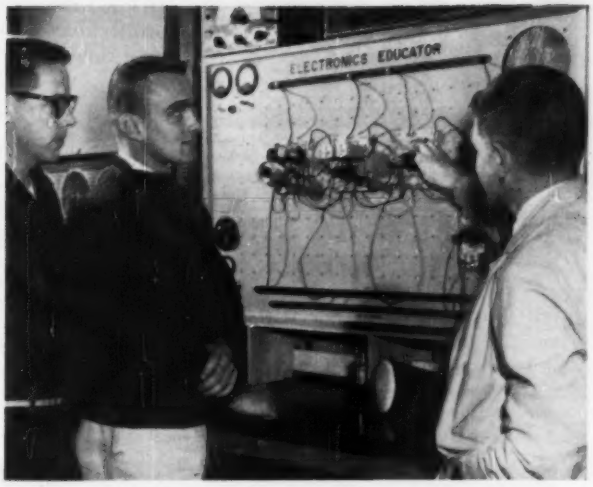
Occasionally, a relay circuit is connected to a special transformer constructed in the laboratory. It is used to detonate a small firecracker to emphasize a point in the lecture. A foot switch can be connected to an alarm bell which the instructor can use to arouse a drowsing student – as if anyone would dare doze in Mr. Culpepper's classes!

At times the laboratory takes on the atmosphere of a science-fiction movie. High-voltage generators are set up to illustrate a lecture on voltage and insulation. Sparks crackle and hiss and electric fire seems to spout out of almost everything in an eerie and awesome fashion. A neon transformer, suitably protected for safety, serves as the voltage source for a Jacob's ladder while an electronic Tesla coil produces a corona discharge that will light lamps in the instructor's hands at a distance of several feet. Rings fly up from a coil to illustrate Lenz's law, or a small model house will burst into flame to emphasize the danger of overloaded wiring circuits.

These items are not just shown and then put away. They are placed about the laboratory, and class members are invited to experiment with the equipment and to try out the demonstrations. Arranged on the walls of the laboratory are many teaching aids built by students to demonstrate or illustrate some basic principles of electronics. They range from mock-ups of vacuum tubes to working models of electronic circuits.

On one side of the room is a complete telephone switchboard with connections to each of the work stations so that, in studying the telephone as a tool of communication, the students actually can assemble the components of a telephone and talk through the switchboard to other student groups at their work stations in the laboratory.

A special class project this year is



SIU Instructor Culpepper (right) demonstrating to Wesley Deaton (left) and Donald Bretsch a radio circuit made as a class project. The components can be converted into either a television receiver or into a lie detector.

an electrifying bit of razzle dazzle called an "electronics circus" with a menagerie of devices used to demonstrate the four fundamental units used in electronics circuits: resistors, capacitors, tubes or transistors, and coils of wire. Complete with necessary stage props, the show has been presented before area industrial-education teachers and a sectional group at the American Vocational Association meeting in Chicago early in December. As time permits, the circus is being staged in area high-school industrial-education departments to illustrate teaching possibilities and to stimulate interest in electronics among high-school youngsters.

SIU junior industrial-education students, John Booker (left) and Donald Pilney, playing with a wireless induction telephone made by Pilney from a pair of old earphones and other scrap and inexpensive materials as a project for this unique electronics class.

The "show" starts with a startling bang to gain audience attention and then the "ringmaster" (one of Mr. Culpepper's students) puts a coil of wire through its paces as a magnet, a transformer, or a reactor. Other acts include using high-voltage generators to illuminate lamps without wires or connections through the creation of high-energy fields. The internal workings of telephone systems – from those used on rural lines to modern, long-distance dialing – are simplified for understanding. The essential components of radio and television receivers are mounted so that their working parts can be observed easily during the demonstration in which a walkie-talkie is used to transmit signals to the receivers. Various electronic control systems, such as those used in industry, demonstrate the principles of automation.

"The devices we use are not really so new or different from those that have been used for years in science demonstrations and in entertaining at laboratory open houses," Mr. Culpepper points out. "More important, I believe," he adds, "is that most of the devices in the laboratory and for the 'circus' were built by students from inexpensive materials and components which are within reach of the average school's budget.

"If the devices cannot be duplicated at small cost, it is useless to include them in a course for teacher training," he explains. "The difficulty is that many teachers today do not know where to find materials or how to construct materials and devices at small cost which they may use to make electronics more interesting for their students." ★

KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

Clean Hands, Bottle Method

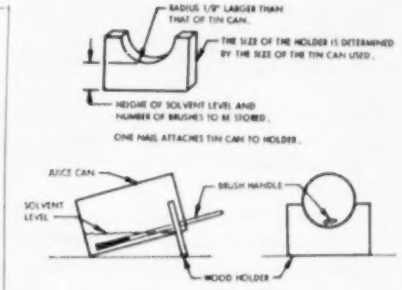
When students' hands become greasy and dirty in the auto or machine shop, an effective cleaner, we have discovered, is any one of the various commercial waterless-type hand cleaners. To save the cost of buying a commercial dispenser or the inconvenience of opening the can each time a student needs some cleaner, we dispense this cleaner from a plastic squeeze-type bottle in our shop. This plastic bottle method is also economical; one squeeze will usually give just the right amount of cleaner needed.—*George S. Watson, East Palestine, Ohio, High School.*

Dip That File

When filing aluminum, a better and quicker job can be accomplished if the file is periodically dipped in a pail of water kept beside the work. This method will not only keep the file cleaner—the aluminum filings will float off the file—but it will keep metal scratching to a minimum.—*Harry Flaster, Brooklyn, N. Y.*

A Brush-Cleaner Stand

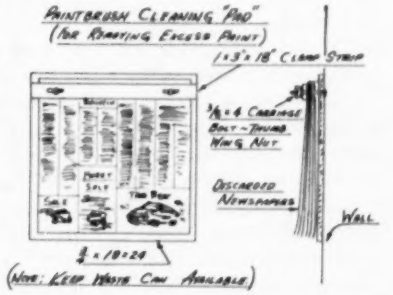
Keeping paint and shellac brushes in good condition is a problem, especially in the junior-high-school shop. In our shop we have used the holders shown and have kept the brushes in good condition with the least amount of effort on the part of both teacher and pupil.


RADIUS 1/8" LARGER THAN THAT OF TIN CAN.
THE SIZE OF THE HOLDER IS DETERMINED BY THE SIZE OF THE TIN CAN USED.
HEIGHT OF SOLVENT LEVEL AND NUMBER OF BRUSHES TO BE STORED.
ONE NAIL ATTACHES TIN CAN TO HOLDER.
JUICE CAN
SOLVENT LEVEL
BRUSH HANDLE
WOOD HOLDER

The cans are easily obtained from the school kitchen. The stand is made from scraps of wood. Although the brushes lay in a solvent exposed to air, the solvent loss is more than compensated for by the brushes saved in a year. Each can-stand may be painted a different color to help the student in placing the correct brush in the proper can. But an error by even the most erratic pupil will not permit the brush to dry out.—*G. V. Cardinale, Roosevelt Junior-High School, Erie, Pa.*

Paintbrush Cleaning Pad

Here is a unit we have found useful for removing excess paint from paintbrush bristles.


PAINTBRUSH CLEANING "PAD"
(FOR REMOVING EXCESS PAINT)
1 x 3 x 18" CLEAN STRIP
3/8 x 4 CARRIAGE BOLT - THUMB WING NUT
DISCARDED NEWSPAPER
WALL
¾ x 18 x 24
(NOTE: KEEP WASTE CAN AVAILABLE)

Fasten a ¾" piece of plywood, 18" x 24", to the wall of the paint shop near the finishing bench. Fasten two carriage bolts to the panel, outward from the wall (see sketch). Fit a ¾" x 2" x 24" slat across these. Tear several single sheets from newspapers

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Here is a small size lever paper cutter particularly suited to school shops where accurate cutting is required but where sizes of jobs do not require a larger cutter. A simple, two-handed safety lock removes practically all chance of injury to operator. Knife cannot fall accidentally nor cutting handle be pulled down until safety lock is held open by operator's left hand at the start of each cut.

Designed for mounting on bench or cabinet, this cutter may be purchased with or without the stand shown in the photograph.

Craftsman 26½" Lever Paper Cutter

The many exclusive features of this cutter make it the most popular cutter for school use. A two-handed safety lock prevents operation of the cutter until safety lock is held open by operator's left hand. The compound leverage action of the knife pull down makes cutting easier. A counter-weight balances the knife bar. A double-grip safety control which requires the use of both hands during the cutting cycle is available as extra equipment.

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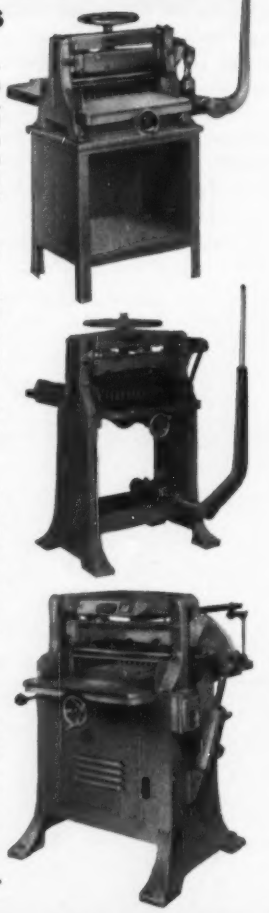

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and clamp these to the panel with the slat, holding it in place with large wing nuts.—*Donald F. Kinnaman, Camelback High School, Phoenix, Ariz.*

Avoid Hand Injuries

Students assigned to work on lathes frequently suffer hand injuries from the sharp points of lathe centers, which are commonly ground so they terminate in a 60° tapered end. By filing a small flat across the ends of both lathe centers, this danger area is eliminated without impairing the work-holding ability of the centers.—*H. Muller, Danboro, Pa.*

Soldering Iron Holder

Here is an answer to the shop problem of how to store hot, electric, soldering irons. The holder shown not only solves the storage problem but also acts as a very practical holder for the iron while it is in use.

This soldering iron holder, which can be made by students at a very small cost, may be hung under a bench or on the bottom of the tool board when not being used.—*William F. Ellsworth, Hicksville, N. Y., High School.*

Keep Your Pencil in Your Pocket

If you have trouble keeping pencils without clips in your shop coat pocket, try this: Wind a rubber band around the middle of the pencil. This will allow you to remove the pencil when needed but will prevent it from slipping out anytime you bend over.—*Fred Sherwyn, Los Angeles High School, Calif.*

Use Torn Abrasive Belts

Here's a saving kink. Don't throw away torn abrasive belts from belt sanders. They are excellent for sanding projects on the lathe, for nosing, or for other contour sanding.—*Richard H. Snow, Tonalea Elementary School, Scottsdale, Ariz.*

Marking Holes on a Cylinder

We have found that an easy way to mark equally spaced holes on a cylindrical surface is as follows: Wrap a piece of masking tape around the surface so that the ends meet evenly. Unroll the tape, put it on a smooth surface, and mark it with the desired divisions. Then apply it again to the cylindrical surface. The positions marked on the tape can now be center punched or marked through the tape onto the cylinder.—*Don Tassone, Garden City Senior-High School, New York.*

Packaged Sand

To obtain good castings, it is necessary to keep foundry sand properly tempered. The best method for assuring this is to construct large galvanized iron boxes with tight fitting lids in which the sand will retain the correct moisture content for weeks.

These covered boxes are ideal for use in the school shop. Since no casting sand should be used until it has been moistened for at least a day, having it available at a moment's notice in these containers will prevent students from trying to temper and use the sand immediately and will avoid disappointments, accidents, and loss of time.—*Louis J. Enos, Lincoln Junior-High School, Sacramento, Calif.* ★

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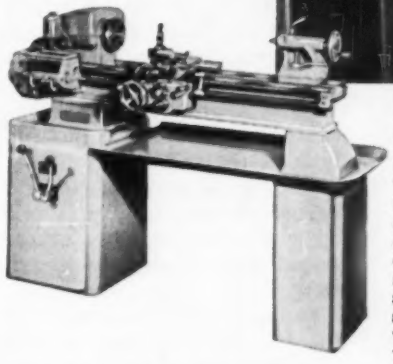

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A complete package of "Working with Light" materials will be sent *without cost or obligation* to shop teachers in areas served by a Better Light Better Sight Bureau utility sponsor. (We will check our sponsor list for your area.) For your free kit, use the readers' service card in this magazine . . . or simply send your own name, and your school's name and address, to: BETTER LIGHT BETTER SIGHT BUREAU, Dept. WWL-1, P.O. Box 1647, Grand Central Station, New York 17, N.Y. *(Offer not available to students nor to subscribers outside the U.S.A.)*

A perennial problem

Preventing Type Loss

By Milton Mathiowdis

Kenwood Senior-High School, Towson, Maryland

TYPE loss, care, and distribution are among the greatest problems of a graphic-arts teacher. Here are some suggestions that will help eliminate or reduce these problems.

General Care of Type. – The length of satisfactory service from type depends on the care it receives from the students who use it. Since improper use of type is a contributing factor to type loss, it is felt that a few precautions on the use of type should be emphasized.

The teacher should check every job put on the press before the students begin printing to prevent damaging the type. He should check to see that there is no unnecessary pressure evidenced by an embossed effect on the back of the printed sheet, that the gage pins and grippers will clear the type form, and that the printed sheets do not show evidence of raised type caused by an improperly planed type form.

Students will often forget to clean the ink from the type immediately after it has been used. If the ink dries on the type, it will cake between the elements making it necessary to use a strong lye solution to remove it. The teacher should keep an eye on students using inked type, at least until they form the habit of cleaning their type as soon as they are finished printing with it. Galleys used by students should be checked periodically by the teacher for pied type and for type no longer needed by the students. Do not allow students to accumulate too much type in their galleys. This will only lead to more type loss.

Cleaning the Case. – The type case is the most difficult piece of equipment in a printing class to keep clean. Naturally, a dirty case will encourage careless handling and eventual loss of some type. It is important, therefore, that the teacher set up a procedure for keeping the cases as clean as possible. After beginning students have used the cases for a reasonable length of time, they will quickly learn how difficult it is to work from a case that has become dirty because of their inexperience. This should give the teacher opportunity to orient students to his method of cleaning cases.

It is recommended that cases be cleaned twice a year, preferably at midyear and at the end of the year. Of several procedures used to clean cases, the following method has proved the most effective:

Two students are assigned to each case to be cleaned. Starting with the beginning of the alphabet, they remove all the type in the *a* box and then return all the *a*'s back into the box, being sure to stand the type on its feet. If there are any other letters mixed in with the *a*'s, they should be placed in their proper box. The students will continue this process until all the letters, punctuation marks, special characters, quads, numbers, and spaces are left standing in the case. Of course, the cases should be inclined and not moved until they have been thoroughly cleaned to prevent the standing type from falling. With the type standing on its feet, the teacher can very easily check to see that students are placing the type in its proper place in the case.

Each students is assigned, at the beginning of the period, to clean two or more compartments in the case, depending on the amount of type in the compartments. The teacher then records this assignment on a *Case Cleaning Grade Sheet*. Near the end

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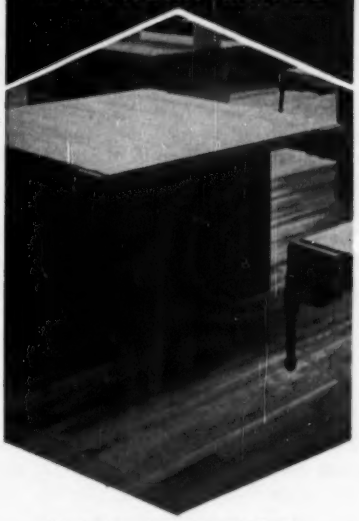

Woodworking Shop, Sr. High School, Oneida, N. Y.—Arch., King & King—Installer, Floor Contracting Co., Inc., Syracuse, N. Y.

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Take Woodworking shops — 30% of the school districts covered in a recent impartial survey report they have at least one Woodworking shop floored only with bare Concrete. Of these, over half said they "prefer" Hardwood Strip, but —

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of the period, the teacher checks each student to see what has been accomplished and grades the students accordingly. All the daily grades are averaged at the completion of each case to reach a final grade. This grade will carry the value of one project.

If the above procedure is used to clean the cases, it should not take much more than one week (5 periods a week) for four classes to complete 16 well-filled cases.

Type Loss during Composition.— Precautions should be taken by the teacher to reduce the amount of type lost when students are composing. It is probably at this time that more type is lost than at any other time during the student's learning period.

Some suggestions that can be used for reducing the loss of type during composition follow:

1. Take two or three minutes before the clean-up period to have each student setting type pick up the type on the floor at his feet and return it to the case.

2. The instructor can make the students feel he is checking the cases at the end of each period by spot-checking a few of them.

3. The instructor should keep careful watch on students setting type throughout the period with frequent visits to a sampling of students.

4. A small piece of type can be given to each student at the beginning of the year so that he can learn early that type is not really functional outside of class. This could stop the curious from taking type out of class.

5. Make the students feel responsible for the type they use while they are learning to set it by assigning each student to a specific case. Two students in the same class period may be assigned to one case.

6. The proper distribution of type will eliminate many headaches. Students should notify the teacher before distributing type, and the teacher should make sure the students know where it should be returned. The teacher should also check the progress of students frequently when they are distributing type.

It should be mentioned that some type will get lost no matter what means are used to prevent it; but by using certain classroom procedures, the amount of type lost should be reduced. It is hoped that the reader will be encouraged by these suggestions to work toward the elimination of the problems concerning type in his program or situation. ★

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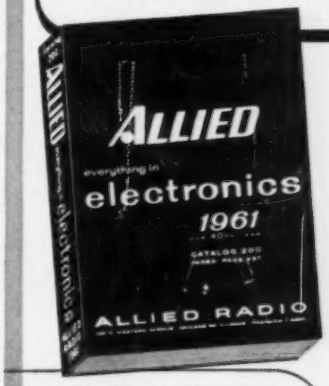

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Two-Track . . . . *from page 13*

includes oblique, cabinet, isometric, and elementary principles of perspective drawing. Development Drawing: covers basic principles of patterned developments for truncated and offset prisms, primarily in preparation for sheetmetal drawing offered in the fall.

Engineering Drawing II. General Field of Drawing. – To learn the applications of mechanical drawing to various fields and trades with particular emphasis on drawing symbols and conventions; and application of fundamentals learned in Engineering Drawing I.

First Semester. – Sheetmetal Drawing: development of patterns of sheetmetal products requiring intersections, transitions, and triangulation. Statistics Drawing: plotting various types of line and bar graphs from given statistics. Schematic Drawing: learn how to draw and read symbols instead of real pictures of parts for equipment and construction diagrams. Used in some form or another in all fields.

Second Semester. – Machine Drawing: includes working detail and assembly drawing from preliminary design sketches; and formula work, use of thread tables, and thread specifications to draw true threads of machine bolts, studs, and screws. Exploded views are made of the working drawings after they are completed. Map Drawing: covers various types of maps, reading of contour maps, and map symbols; also use of the pantograph to transpose sections from given contour maps. Architectural Plans and Perspectives: how to draw set of house plans including plot plans and some elevations; also the up-to-date features of good home planning are studied.

(Note: During this second year, the instructor takes every opportunity to bring in consumer education, relate the topic being studied to community facilities, and to discuss the job opportunities in drafting now as well in the future.)

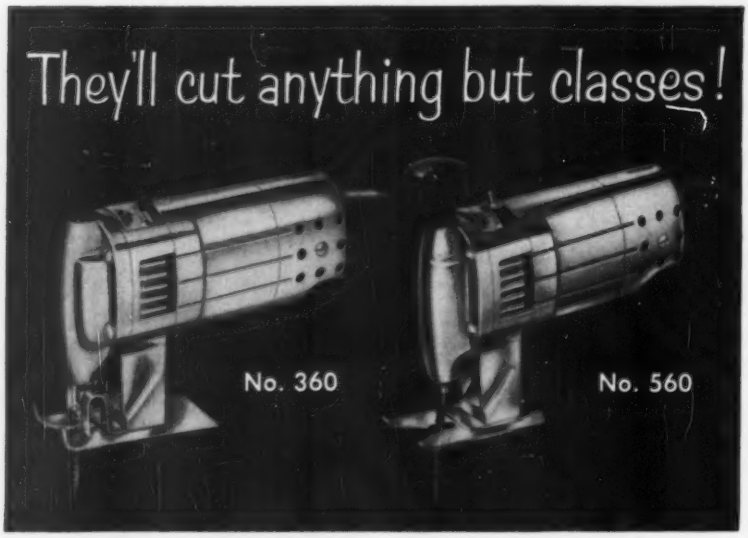
Engineering Drawing III. Advanced Fields of Drawing. – The primary effort in this course is to produce as much original work as possible, applying the principles unique to the fields of drawing covered in the previous year.

First Semester. –Machine Drawing: making working detail and assembly drawings of machine parts. Production illustrations are also made of these parts. Inking is also practiced by tracing some of these machine drawings. Sheetmetal Drawing: to develop patterns similar to manufactured sheetmetal ducting.

Second Semester. – Map Drawing: relating surveying to the study and drawing of local community maps and properties. Architectural Plans: a complete set of original plans for a home the student would like to live in is planned and drawn by him, including a perspective with landscaping sketches.

Engineering Drawing IV. Specialized Drawing. – Special work giving the student every opportunity to not only handle special drawing equipment and materials but to do advanced drawing work of his own selection, or that which approaches work done by a professional draftsman.

First Semester. – Architectural Presentation Plans: rendering architectural plans on a single sheet of illustration board for display. Architectural Model Construction: duplicating the realistic features of home construction by using art, drawing, and other kinds of materials; modeling kits are not used. Special artist-



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draftsman pictorial presentations of architectural interior and exterior features are done.

Second Semester. — Machine Drawing: working details are made from given assembly drawings, and assembly drawings are made from given detail drawings. Manufacturing, identification, and design illustrations are drawn from these parts.

The Shop Drawing courses are different from the Engineering Drawing courses just described in the following ways:

First, the Shop Drawing students' drawing assignments differ from those of Engineering Drawing students because of the difference in interests of the students.

Second, whatever assignments are similar in type or field of drawing are presented for the students' use from an avocational, trade, industrial-shop standpoint. Fundamentals and drawing practices are just as strongly stressed as in Engineering Drawing except that learning is more directed toward learning by doing and simulating basic drawing examples instead of solving complex problems.

Because of significant similarities in the two drawing courses, and the fact that the descriptions of the Engineering Drawing course have been made in some detail, the descriptions of the Shop Drawing course will not be as complete.

Shop Drawing I. — To learn the fundamentals of mechanical drawing with particular attention being directed toward its use in planning shop projects.

First Semester. — Topics covered are lettering, instrument drawing, dimensioning practices, sketching, single-view drawing, two-view drawing, three-view drawing.

Second Semester. — Section Drawings: sketching, single-view drawing, two-view drawing, and three-view drawing (similar to orthographic and section drawing in Engineering Drawing I, only covered in greater detail). Shop-Project Drawing: to design and plan drawings of actual projects made in the school shop; how to make a bill of materials and to include notes or specifications on a drawing. Pictorial Drawing: includes oblique, cabinet, and isometric drawings. Development Drawing: covers basic patterns for cylinders, boxes, cones, and pyramids and truncates of the same. This is offered in preparation for sheetmetal drawing offered in the fall.

Shop Drawing II. General Fields

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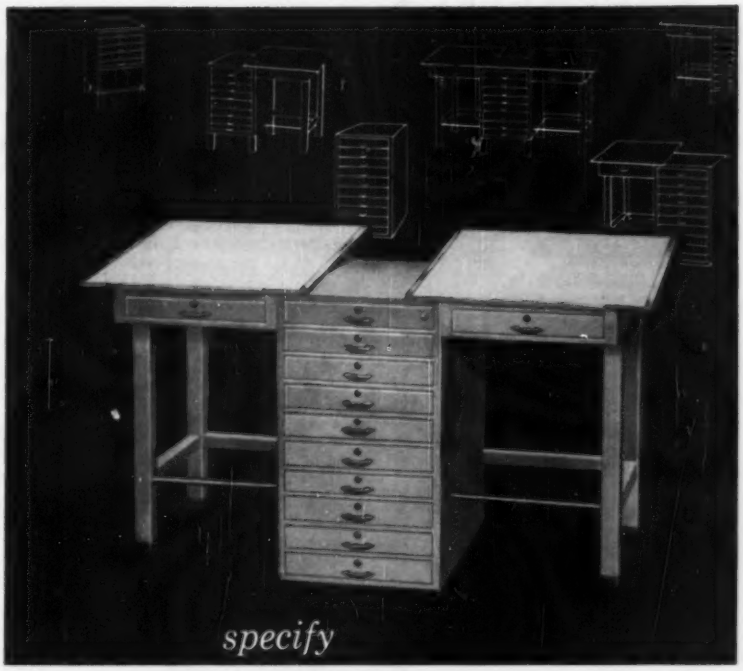

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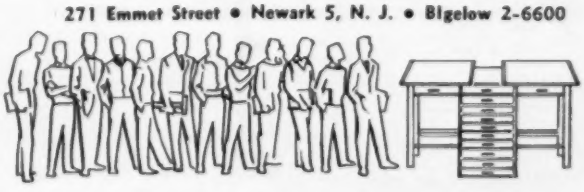

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of Drawing.—To relate drawing work to the various trades with emphasis on first-year fundamentals and consumer education.

First Semester. — Sheetmetal Drawing: Much time is spent on sheetmetal-product drawing such as tube ducting, intersections, and common household sheetmetal products.

Second Semester. — Schematic Drawing, Machine Drawing: detail and assembly drawings from given drawings. Also single isometrics or obliques of single machine parts. Plumbing Drawing: pipe assembly and diagrams. Carpentry Drawing: building construction assemblies or details and pictorials. Electrical Drawing: wiring diagrams and electrical equipment. Architectural Drawing: how to draw house plans and drawings from given information, making corrections or additions to bring them up to date.

Shop Drawing III. Advanced Fields of Drawing. — Primary purpose is instruction in use of symbols, building and machine construction, and some drawing work related to industry.

First Semester.—Architectural Plans: complete set of plans having indications of where symbols are missing, including elevations in drawings. Details to be drawn according to Federal Housing Administration requirements.

Second Semester. — Machine Drawing: similar to machine drawing of Engineering Drawing II. Also, inking is practiced by tracing some of the machine drawings.

Shop Drawing IV. Original and Specialized Drawing.—Machine Drawing and Architectural Plans: similar to Engineering Drawing III.

To date the reaction of students to these programs has been more than favorable. Those students who had taken work under our old set-up told me before they left school that they enjoyed taking drawing instruction in classes where all students had similar interests and needs.

Over the years, evidence has continued to pile up that indicates we are on not *the* right track, but right tracks. We have had fewer discipline problems; neater and more accurate work; individual grades — particularly among the advanced students — have become better; greater attention is being paid by all students during lectures; parental interest has grown; classroom tensions have eased because of more student cooperation with each other; fewer elementary questions are being asked because of the

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closer attention being paid during the lectures, making of assignments, and demonstrations.

Benefits to individual students have been several. Some of them are: The above-average shop student has been upgraded and some of the general, noncollege-prep students are being directed into programs leading to careers in industrial-arts teaching and engineering. Tardiness has decreased. Students spend more time hanging around the classroom on their own time to discuss their particular drawing problems with the teacher. A genuine interest is being shown by the boys for more complex, as well as additional, assignments. The Engineering Drawing students are proud of their status. The Shop Drawing students are equally proud of their position because they do not now have to struggle with work they feel is of no immediate use to them.

From the point of view of the school in general, drawing has been elevated in prestige in relation to the over-all curriculum. For instance, the students in Engineering Drawing have raised the status of that course to the same position of eminence now enjoyed by the science courses. The administrators and counselors have accepted the changes in the mechanical-drawing program by changing the sections in the freshman handbook and course-of-study manual accordingly.

Neighboring Chico State College has recognized the revamped drafting program in our high school by admitting our Engineering Drawing graduates directly into Engineering Graphics and Descriptive Geometry, by-passing Drawing I and II. Our graduates entering industrial-arts teacher-training programs have been admitted into Advanced General Drafting directly at Chico State.

One of the most gratifying expressions of success that we have experienced, though, is the number of graduates who have come back to us and reported the help their high-school drafting studies have been.

It almost goes without saying that we have not allowed our Two-Track Drafting Program to sit still. It has been under constant revision since we set it up. Presently we are considering doubling the class period for fourth-year students. Also, we are presently discussing adding a one-year course in remedial drawing for mentally retarded students as well as to discourage dropouts. ★

Fixtures . . . . . *from page 16*

signed to accommodate parts which would be difficult to handle with standard equipment, or which might be difficult to hold and position in a manner which would enable the parts to be machined to the required limits of precision. Fixtures are commonly used on all types of machine tools; there is no limit to possibilities.

It is not claimed by the writer that the tooling described is, in all cases, the "final word" in design. Neither are they examples of extreme mass-production tools such as those used where vast quantities of parts are processed day in and day out. However, all manufacturing is not on a large-quantity basis, and most of the students who designed and built these tools had never set foot in a machine shop before coming to us. A number of the illustrated designs have been unusual enough to be requested by the American Society of Tool Engineers for inclusion in a forthcoming textbook of jig and fixture design.

In all, 142 pieces of tooling were designed, built, and put into use in the completion of this one project. ★

P-2, the PULLMAX MACHINE

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Vocational and trade school teachers throughout the world demanded a Pullmax machine designed and priced for shop instruction work. Now Pullmax offers their new school shop machine model P-2 to answer that need. This machine is small and compact, yet has a ⅛" cutting capacity in mild steel. It's a complete sheet metal shop in one machine that enables students to make such projects as book stands, barbeques, grills, book ends, house numbers, lamps, trays, stools, and many other items.

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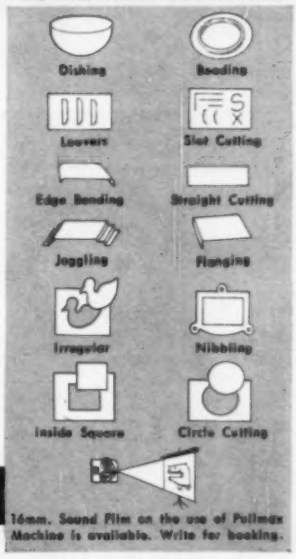

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For woodworking students of all abilities

Shoemaker's Kit

By O. S. Harrison
The University of Georgia, Athens

THIS miniature shoemaker's kit can be used as an attractive container for cigarettes, matches, pins, and other small items, or it may be used as a planter.

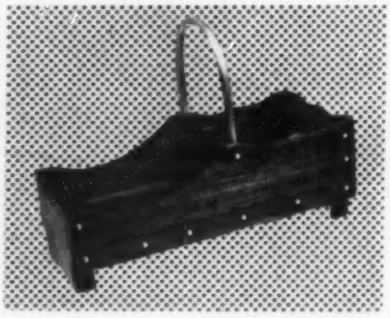
It is not a difficult project but there are tool operations necessary for its construction that will challenge most students.

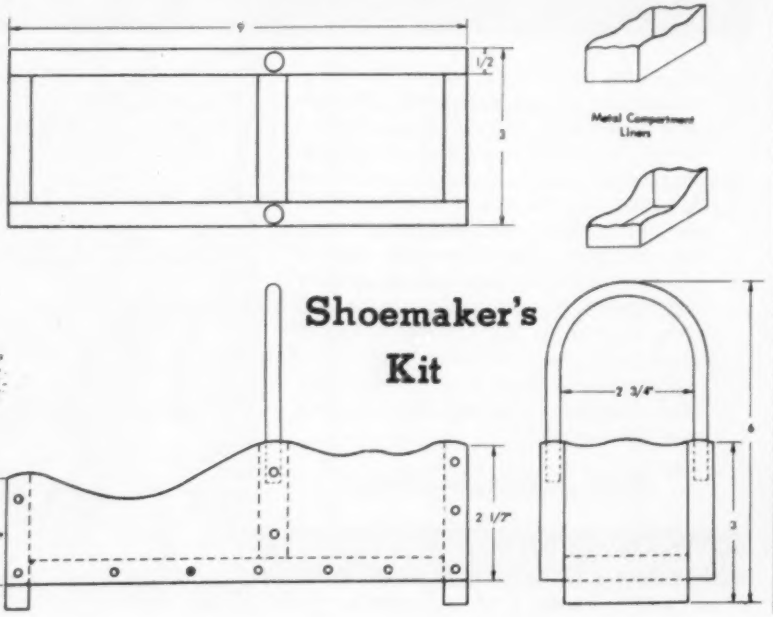
This is a Colonial-type project and it should be made of either walnut, pine, or cherry. The handle can be made from ¼" copper tubing. Large-head nails, or wood pegs, can be used in the construction. Another construction method would be to use 1" flat-head screws covered with screw-hole buttons.

A few hints on making this container follow:

The curved side pieces and end pieces should be first laid out on the stock, according to the drawing, and cut out. Holes should then be drilled in the side pieces for the handle. Bend the handle carefully and insert it in the holes. Lay out a pattern on paper for metal boxes to be used as liners for the kit. Form paper boxes to determine if they fit the compartments. Lay out and cut out the metal patterns. Form and fasten with solder. Finish the kit with a rubbed shellac and varnish finish.

This kit would look equally well stained or with a natural finish. ★





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Talented . . . . . *from page 12*

is open to seniors enrolled in physics, although some juniors have taken it. Plans call for expanding the course to two sections for seniors.

During the organization of the course back in 1958-59, the discussions indicated that a new industrial-arts concept was urgently needed if we were to offer our part of general education successfully to boys with academic talent. The question: How far can we go without encroaching on the science department's territory? faced us time and again. We were left with only one solution. We resolved this problem – as I have tried to indicate – by insisting on close liaison between the industrial-arts department and the science department in developing the curriculum content.

One result of this liaison is that physics, mathematics, electronics, and chemistry are taught in this course from the point of view of their applications in industry, thus supplementing the existing science and mathematics courses.

And, that is the story of our Engineering Mechanics course for the academically talented in our school. We have all gained from it. Its benefits have been mutual – to students, to teachers in other departments, to industrial arts. ★

Superb Finish . . *from page 20*

quer formula to best suit your needs.)

All lacquer finishes are sprayed: the sealer, stain, and lacquer. The consistency of the lacquer will depend on your spray equipment. Generally, we cut our lacquer with one part of thinner to three or four parts of lacquer, and spray at about 40 p.s.i.

We spray two coats at a time, allowing the first coat to become just about dry to the touch before applying the second coat. The second coat should be allowed to dry for several hours, usually overnight, before it is rubbed down hard to a smooth and even finish.

We repeat this stage of the finish process until we have four to eight coats of lacquer on the project. The final coat is then rubbed down with 400 grit wet-dry paper and rubbing oil. Those parts that canot be rubbed with paper, turnings and mouldings for example, are rubbed with 000 steel wool.

The final polishing is with rubbing compound and rubbing oil. The sheen or gloss is controlled by the amount of rubbing with rubbing compound. After the rubbing is done, the project should be cleaned with a small amount of Varsol applied with a cloth and rubbed dry with a clean cloth. The project is then waxed with a good paste wax.

We do not use lacquer on parts that will rub other parts, such as drawers, because the contact surfaces will then have a tendency to stick. Instead, we put sanding sealer on the inside of drawers, on the sides and bottoms, and inside the cabinet. This not only seals the wood but makes the drawers slide more smoothly. These parts are also waxed.

We believe firmly that a lacquer finish is a superb way to finish a fine piece of wood work, but we do not discount the many excellent qualities of a penetrating finish. We use a penetrating finish on small wood projects, such as bowls and trays, and even on some larger pieces. It is beyond a doubt the simpler of the finishing processes.

We prepare the wood as we would for any other finish. If the wood needs

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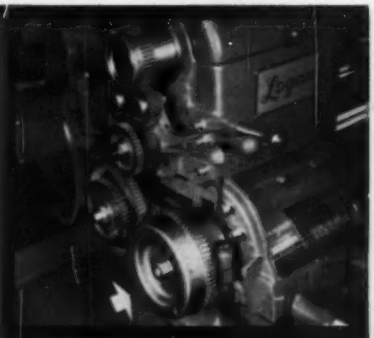
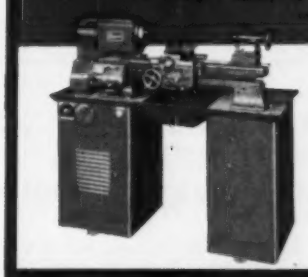


12" Lathe

All Logan 11", 12" and 14" lathes, as well as models 1825 and 1875 (*shown*) 10" lathes, now offer positive overload protection without additional cost. Exclusive Automatic Safety Gear absorbs shock of sudden overloads when threading, preventing gear damage from spindle to gear box. Also protects all gears in gear box up to 52 threads per inch. The combination of this Safety Gear and spring-loaded lever-operated clutch in apron gives the same protection for corresponding feeds. Can be factory installed on other models of new 10" and 9" quick-change lathes. Available for present Logan quick-change lathes: $10 for 9", 10" and 11" sizes, $15 for 12" and 14".



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filler, we use paste wood filler. We apply any coloring or stain before we apply the finish, although colors in oil can be mixed in the penetrating finish for the first coat.

The only equipment needed to apply this type of finish is several clean cloths. Mop on the penetrating finish applying as much as possible without letting it run. Allow this application to dry for 15 to 20 minutes, depending, naturally, on the weather and how fast the finish dries. Once it has dried in, but before it gets tacky, wipe off the excess with a clean cloth. Allow application to dry overnight.

The following day, or when the student gets around to it, the project should be thoroughly rubbed down with 000 steel wool until it is smooth. This process has to be done again for the second coat, the third coat, the fourth coat, and even the fifth coat. We generally stop at five and then rub the item down thoroughly with 000 steel wool. Now the project is ready to be waxed.

Should the humidity be very high, it would be well to allow the first coat to dry at least two nights to allow it to become hard enough to take a good steelwool rubbing.

Testing a finishing process on a piece of scrap wood before trying it out on a good project not only will spare you the anguish of not achieving the desired result, but it will also serve you as an experiment to test individual differences and check on the processes themselves. Do not forget to sand the piece of scrap wood just as you would a finished project.

Sealers, stains, lacquers, and waxes show up well on wood only if applied by gobs of elbow grease. ★

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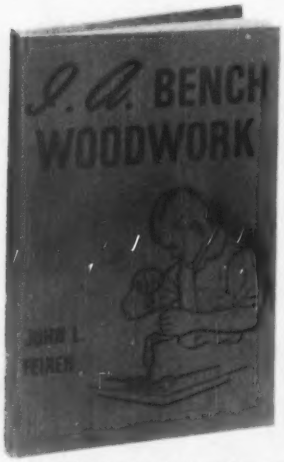

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Kenya . . . . . *from page* 19

indication appears in the number of teachers applying for the new training. At the time of the last recruitment there were more than 100 applicants for the 25 available places. Several T2 and KT1 teachers were included in this number. (This is the government's designation of the highest trained teachers in government service. Formerly they were the most academic minded of all teachers in the school system.)

Time will be the deciding factor in the success of the experiment. Because American financial support has been withdrawn, there may be danger of a watering down of the program. With the prevailing practice of rotating instructors after a three-year tour in one location, there may be a danger of lack of continuity in the program. One fact is evident: The Africans like the program. Academic teachers are beginning to look on the handicraft teacher as their equal. Because entrance requirements were set at a level equal to academic teaching, this acceptance should remain.

With intermediate-school students wanting handicraft instruction, it is hoped that they will begin to look on manual work with more favor. Today's African teacher still carries much of the native about him. His education is mostly a veneer. It will take generations before it becomes an integral part of his makeup. Will handicraft instruction withstand this test of time? Will it assist in raising the standard of living in the native villages by helping to provide more of the items which can be handmade but which are presently in the luxury class? Lastly, will it assist in changing attitudes in accepting the dignity of labor?

This, then is the challenge! ★

News ABOUT TRAINING

The Technician

Technician Training Figures Prominently at A.S.E.E. Meeting

THE role of technicians and their training figured prominently in the deliberations of more than 3,000 engineering educators at the 68th annual meeting of the American Society for Engineering Education held at Purdue University, Lafayette, Ind., this past June.

Heading the list of addresses made at the convention concerning the technician was that of G. Ross Henninger, president of the Ohio College of Applied Science. He reported on a three-year study of technical-institute education concluded recently by the A.S.E.E. (*See book reviews on page* 46.)

Mr. Henninger said that the much publilicized shortage of engineers and scientists is really "an acute shortage of qualified technicians in engineering and science." He continued, "An appalling proportion of graduates in engineering and science continue to be occupied with work which has evolved out of engineering science into engineering technology.

"This has been reliably reported to be as high as 75 percent of the manpower in some engineering departments," he declared. In his report, he called for "courage to turn over to the engineering technician those segments of yesterday's engineering and science which have become today's technologies."

His report also pointed out that enrolment statistics showed that the projected number of college-trained scientists and engineers "fails very substantially to meet our expanding requirements on the basis of traditional utilizations. Yet there are many young people," he continued, "who have the capacity, interest, and aptitude to develop productive and rewarding careers in applied science which neither require nor justify as many as four years of collegiate study."

At the same session of the meeting, Frank D. Leamer, personnel director of Bell Telephone Laboratories, Inc., commented that it is not necessarily a shortage of available individuals that is disturbing, but rather that a large reservoir of potential young people is not being adequately trained to meet manpower needs. He said that about one-third of the upper half of high-school graduates complete their college educations. If, he continued, a large proportion of the remaining two-thirds of this group, even though they be predominately women, became technicians, much of the technician-shortage problem would be solved. (*Turn to page* 40.)

"Is that a way for a shop foreman to enforce discipline?"

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30B
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While graduate work in mathematics, physics, and electronics is always helpful, it isn't necessary when you use the Crow course designed for your particular age group and subject. Simply send for this FREE booklet, "Programs for Teaching Electricity-Electronics" . . . select the program suitable for your students and write us. We will supply a custom-tailored course of instruction, complete with text, instruction manuals, student equipment, instructor demonstration aids, lesson sheets, and power supplies.
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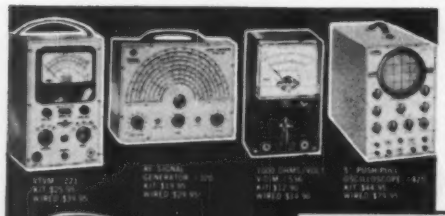

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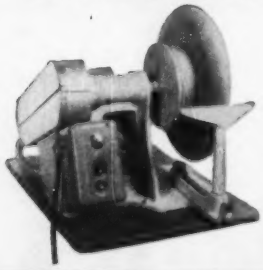

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Mr. Leamer reported also that industry has looked to the technical institutes to supply the required number of qualified individuals with the basic education for technicians, but the quantity of graduates falls short of opportunities that exist. He said, too, that the range of salaries for technicians is clearly beyond the present range for skilled craftsmen, although it overlaps the craftsmen's salaries at the lower end of the range.

Dr. Eric Walker, president of Pennsylvania State University, a third speaker at the session on technician training, called for re-evaluation of the nation's educational structure for training members of the engineering manpower team at both ends of the spectrum. Dr. Walker cited one of the technical institute's major problems, which is recognition of its value and status. He said that the tendency of traditional colleges to look down on the two-year program for high-school graduates as not being academically respectable is probably based "in part on misunderstanding.

"Certainly, it is based on sheer snobbery. But here in America we can afford to support neither misunderstanding nor snobbery," he said.

Kenneth L. Holderman, coordinator of Commonwealth Campuses at the Pennsylvania State University, was presented the 1960 James H. McGraw Award for outstanding contributions in technical-institute education from the A.S.E.E. The award carries a $500 cash prize with it, and it is administered by the association's technical-institute division.

Tech Education Reaches Across the Border

INTERNATIONAL cooperation between an American technical-education institution and a Canadian manufacturing firm is now in its seventh year.

In 1953, the training director, personnel manager, and a top-management representative of the Atlas Steels Limited Corp., Welland, Ont., Canada, requested the Evening and Extension Division of the Erie County Technical Institute of Buffalo, N.Y., to organize and present a four-year metallurgy program — along specific company requirements — for specially selected employes from various departments of the firm.

Subject matter taught employes from engineering, sales, metallurgical laboratory, heat-treating, and cold-draw departments included chemistry, physics, strength of materials and

testing, metallography, metals processing, fabrications, allied materials, nondestructive testing, and industrial instruments. The first group graduated numbered 14; the second, 16; and two groups, 24 in each, are well in the program now.

The Erie County Technical Institute has also taught "short, intensive courses" in communication skills to several hundred of Atlas' office personnel. A foremanship-training course has been conducted twice, and is being offered this year. A reading-improvement course, also, has been taught company executives.

Faculty from E.C.T.I. – as many as four at times – have had to travel a 56-mile round trip from Buffalo to Welland 36 weeks each year. At first, border problems inconvenienced transporting equipment and books back and forth, but arrangements made by officials of Atlas with border officials have relieved this problem.

Dr. Lawrence L. Jarvie, executive dean of New York State Community Colleges, has said of the program: "As long as we can continue to offer our services to our Canadian friends without handicapping the services we offer to local industries in the United States, we shall continue to do so."

New Ohio Program

One of the few institutions offering technician training in Ohio is the new Barberton Technical School which began a mechanical engineering technology program last fall. Kenneth J. Herbert heads the school.

"It's not that kind of drawing, George."

San Diego Outgrows Facilities

With 4,950 of the 11,126 students at San Diego, Calif., Junior College enrolled in trade and technical courses, the college has already outgrown its new facilities which consist of a three-story addition to existing buildings. Plans are now under way for a new junior college at a new site.

Nevada Programs Grow

Training in various technical occupations is being given to 450 citizens of Nevada, according to a recent report from that state, under the provisions of the National Defense Education Act. Area programs are being carried on in Las Vegas, Reno, Hawthorne, and Carson City with a representative advisory committee set up in each of these communities.

Electronics technology is the most in demand. Other programs being offered in the state are automated data processing, highway-engineering technology, and building-construction technology. Much encouragement has come for the programs from present and potential industries located in the state. ★

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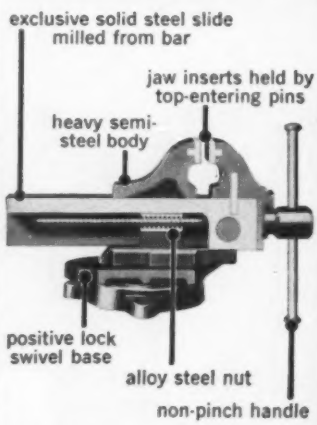
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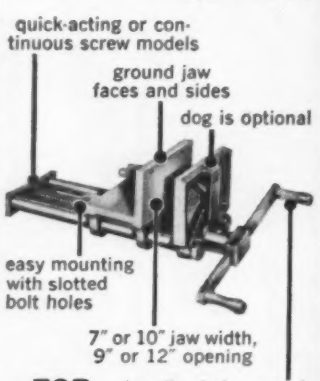
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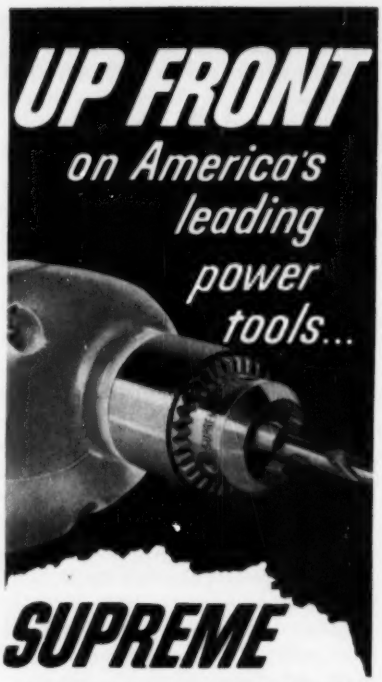
Mr. Bawden

WILLIAM T. BAWDEN, retired professor of industrial education at Kansas State Teachers College, Pittsburg, died in March at the age of 85. During his long and varied career, Dr. Bawden was director of vocational education at Tulsa, Okla.; assistant commissioner, U.S. Office of Education; and assistant dean of the college of engineering, University of Illinois. He organized the department of industrial arts at Illinois State Normal University. Perhaps his most notable contribution to the advancement of industrial education was through the Mississippi Valley Conference, which is composed of heads of industrial-arts teacher-training institutions. He served continuously as chairman of this organization for more than 30 years. Dr. Bawden was the second American to receive a doctorate in industrial education.

LAYTON S. HAWKINS, former federal director of vocational training for national defense workers during World War II and a pioneer in the field of industrial education, died in late July at the age of 83. He was a member of the original staff of the Federal Board for Vocational Education, formed in 1917, and had served in various capacities in the vocational division, U. S. Office of Education, and the New York State Department of Education as well as in private industry and as a teacher in several universities.

RUPERT N. EVANS has been named chairman of the Division of Industrial Education at the University of Illinois, replacing M. RAY KARNES who has been appointed professor of higher education. Mr. Karnes will specialize in post-high-school technical education. He will be engaged in research and the conducting of surveys for the most part.

OTTO KLITGORD, president of the New York City Community College, Brooklyn, since its establishment, died while enroute on a special mission to Puerto Rico. ★



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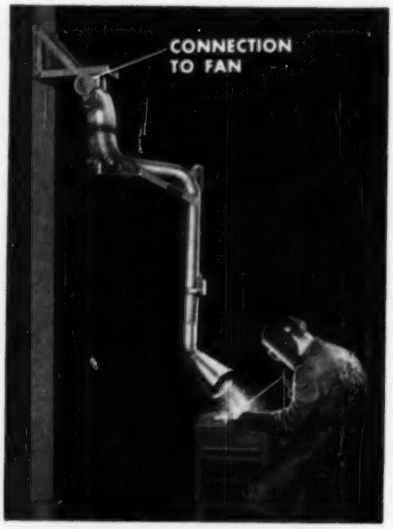

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

The Thinker

SOMEWHERE in the world of art there reposes in solemn grandeur a piece of statuary which is considered emblematic of the person who sits and thinks. There is nothing to indicate what he is thinking about, so it appears that all one needs to do to be immortalized in bronze is to think.

The thinking need not necessarily lead to any constructive action. To become famous all one needs to do is to sit and think. And there is much of this type of thinking being done in the world, particularly in the field of industrial arts.

As some teachers meander on their weary ways to school, they have been known to pause beside a majestic building in the process of construction and to think deeply as they tarry. And what do they think about? They may think that the foundations are inadequate to support the building. They may think the engineer in charge of the project must be incompetent. And it may be evident to them that the methods of handling the heavy materials are woefully inefficient. Having registered some of these deficiencies in their minds, they pass on without making an effort to help the engineer by pointing out his errors. They thought about the job, but did nothing about it.

When these individuals reach their schools they are still thinking. They are thinking of the dreary day ahead of them, they are thinking about quitting time, and they are thinking about their salary check, which is about due. They consider these matters profoundly important and well worthy of serious thought.

Then there are teachers who think they possess all the knowledge that man is heir to. And there are others who think they are God's supreme product. They appear to forget that people average up about the same, regardless of nationality, race, color, creed, or political affiliation. So they think that those who differ from them in these respects are made of inferior clay.

Then there are a few teachers who think that, some day, they will take part in civic affairs, or that some day they will attend summer school and will begin work on their Master's degrees. And some day they will even start preparing lesson plans for the lessons they propose to teach. The trouble with these individuals is that they never get around to doing anything about the things they have been thinking about.

All of these thinkers get pleasure out of the process of thinking. They build castles in the air, but the castles never materialize. Their thinking does nothing for the welfare of society, nor does it improve the quality of their teaching.

On the other hand, there are many teachers in the field of industrial arts who think constructively. They think about their pupils and their differences and how they can meet the specific needs of each pupil. They think about how appropriate the projects and methods they use are for the groups they are meeting. They think about their lesson outlines and improve them as a result of their experience in using them. They think of their associates who teach other sub-

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more power at the cutter!

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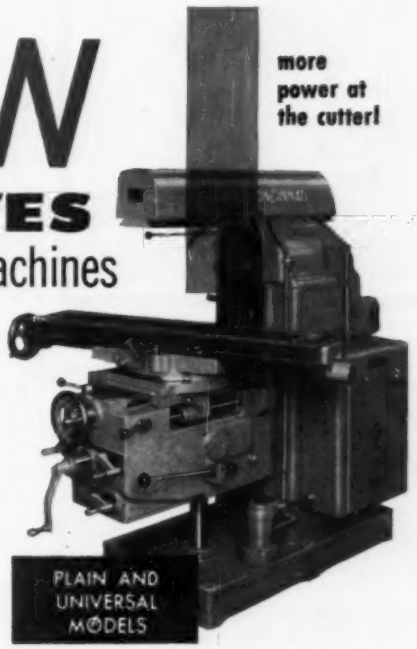

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jects, and they ponder over methods of closer cooperation with them. In short, they are thinking constantly about how they can improve their teaching and serve their pupils more effectively.

Thinking can be a pleasant pastime, or it can be engaged in for the purpose of improving existing conditions. So, blessed is he who thinks, and who uses his thoughts to benefit his fellowman. ★

happenings in industrial education

New Organization

THE Missouri Industrial Arts Teacher Educators is a new organization formed last spring. There are no officers, dues, by-laws, or assessments. The organization plans two meetings a year — at the annual spring conference in Columbia and a discussion meeting in February. Doyle Kemper, head of the department of industrial education, Southwest Missouri State College, Springfield, is permanent chairman.

Teaching the Blind

AN experimental pilot graduate workshop for industrial-arts teachers who are working with blind students was conducted during the past summer session at the College of Education at Oswego, N. Y.

The project was sponsored by the American Foundation for the Blind and the Office of Vocational Rehabilitation of the U. S. Department of Health, Education, and Welfare. The purpose of the workshop was to improve the techniques of teaching industrial-arts activities to the blind and to experiment with and evaluate various new techniques in teaching these activities.

Graphic-Arts Group Grants Surplus $15,000 to Aid Fund

THE National Graphic Arts Exposition, Inc., has contributed $15,000 from its surplus funds to the Scholarship Trust Fund of the Education Council of the Graphic Arts Industry. The first scholarship from this grant will be made in the fall of 1960.

The entire grant will be invested by the Fund to yield sufficient interest to perpetuate an annual scholarship

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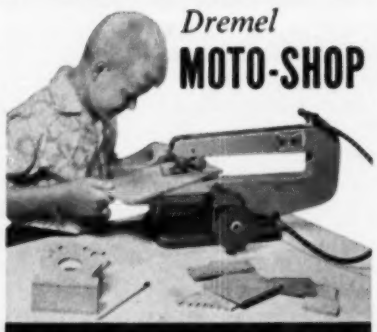

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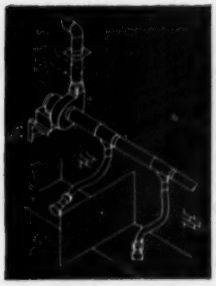

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of $500 per year to the recipient of the award, which will be awarded to one person for four years. The scholarship is named The A. E. Giegengack-National Graphic Arts Exposition, Inc., Scholarship.

Enrolment Up and Down

DESPITE a 7 percent drop in enrolment at Northern State Teachers College, Aberdeen, S.D., this year, the number of industrial-arts majors in the college increased in 1959-60 over 1958-59. Plans are now being made to expand the industrial-arts facilities.

New Officers

WITH the start of the new school year, most state industrial-education associations are making plans for the year's activities with a new slate of officers in charge. Among the new officers, not mentioned in these columns last spring, are:

Texas Industrial Arts Association: Phil Wright, Fort Worth, president; Billy Mayes, Crane, vice-president; and Frank Miller, Snyder, secretary-treasurer.

Missouri Industrial Education Association: Doyle Kemper, Southwest Missouri State College, president; and Robert Kaintz, St. Louis, vice-president.

New Jersey Vocational and Arts Education Association: Leonard Skolnick, Newark, president; Willard Vroom, Trenton, first vice-president; Burr D. Coe, Middlesex County Vocational and Technical High School, second vice-president; Rosalie Cavallo, Essex County Technical High School, third vice-president; Richard O. Harthmann, Jersey City, secretary; and Edmund A. Boyer, Jr., Merchantville, treasurer. ★

Convention Calendar

American Welding Society, Penn-Sheraton Hotel, Pittsburgh, Pa., Sept. 26-29.

Ohio Vocational Association, Southern Hotel, Columbus, Oct. 7-8.

New England Industrial Arts Teachers Association, Wentworth by the Sea, Portsmouth, N.H., Oct. 14-15.

Minnesota Vocational Association, Pick-Nicollett Hotel, Minneapolis, Oct. 20-21.

Kentucky Industrial Education Association, Kentucky Hotel, Louisville, Nov. 4-5.

American Vocational Association, Los Angeles, Dec. 5-9.

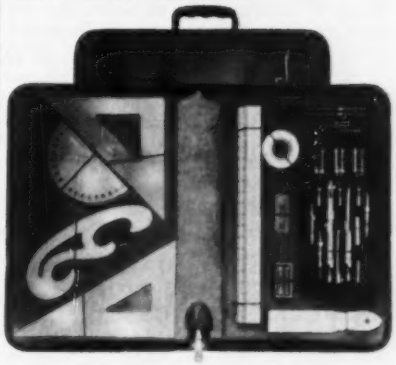
American Industrial Arts Association, Chase-Park Plaza Hotel, St. Louis, April 4-7.

Michigan Industrial Education Society, Civic Center, Lansing, April 21-23.

to school

from school

in school



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instructional Resources

Books:

The Technical Institute in America. Henninger. New York: McGraw-Hill Book Co., 1959. Pp. xi+276. $6.00.

This is the report of the results of a survey made in 1957-58 under the auspices of the American Society for Engineering Education with financial grants from the Carnegie Corporation of New York. The purpose of the survey was to determine what changes had taken place in technical education during the past 30 years and to reveal its present status and potential.

Fourteen regional committees throughout the United States did the field work for the survey which was more or less confined to the engineering-technician field. While the survey committee membership was predominately made up of college and nonpublic technical-institute personnel with few representatives from public schools or junior colleges, the findings of the survey are provocative for those interested in this phase of education. The facts and opinions recorded indicate the potential and the problems facing this area of education such as status, terminology confusions, accreditation, liaison with industry, curriculum organization, and admission requirements.

G. Ross Henninger, who directed the survey, is president, Ohio College of Applied Science and Ohio Mechanics Institute, Cincinnati. *See* The Technician *on page* 39.

General Drafting. (Third Edition.) Fryklund and Kepler. Bloomington, Ill.: McKnight & McKnight Publishing Co., 1960. Pp. 204. $3.40.

The contents of this book cover the fundamental practices of general drafting, and these practices are based on a thorough analysis of the subject. It will function as an excellent class text, since it contains both visual and written instructions, as well as numerous problems which are based on the principles of drafting.

The material is divided into individual units, each one dealing with a specific phase of the work. To further enhance its problem-solving characteristics, these units are grouped with the problems related to them.

Verne C. Fryklund is president of Stout State College, Menomonie, Wis. Frank Roy Kepler, retired, was formerly supervisor of drafting in the Detroit Public Schools.

Architectural Drafting. (Third Edition.) Hornung. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1960. Pp. 230. $5.50.

This book is a basic text in architectural drafting. It is designed for use by students in vocational- and technical-high schools. Each chapter deals with one of the important areas of architecture. These areas include, among others, construction principles, planning a house, heating the house, plumbing, and electric wiring.

The book is well illustrated, and a series of test questions is provided, at the end of each section. These teaching aids, accompanied by the logical arrangement of the various sections, make it suitable for use as a text.

The final section provides an opportunity for the student to prepare the plans for a one-story building in which the ideas presented in the text are incorporated.

William J. Hornung is director of training in the National Technical Institute, New York City.

Woodworking with Machines. Douglass. Bloomington, Ill.: McKnight & McKnight Publishing Co., 1960. Pp. 181. $4.20.

While the contents of this book include considerable information about the characteristics and uses of wood, its primary purpose is to present the reader with practical methods of machining it.

Many of the illustrations presented deal with modern methods of performing certain machine operations. These suggestions will be a valuable aid to the student when his work calls for the use of a machine.

J. H. Douglass is director of vocational education and industrial arts in the public schools of Winfield, Kans.

The Print. Lewis. New York: Adele Lewis Studio of Art and Fashion, 1960. Pp. 32. $2.00.

There is presented in this book a brief pictorial account of the procedures followed in woodcut printing, etching, and lithography. It should be of interest to people working in these fields, and it should aid the lay person to understand the processes involved and to appreciate the product more fully.

Adele Lewis, the author, has a Studio of Art and Fashion in New York City.

American Technical Society's Drafting. (Second Edition.) Giachino and Beukema. Chicago: American Technical Society, 1960. Pp. 280. $4.75.

The material included in this text is designed to provide an organized plan of instruction about the elements of drafting. In the selection of this material, the authors have been careful to use only that which follows current industrial practice.

The book touches on machine drawing, pictorial drawing, architectural drawing,

piping drawing, and electrical drawing, as well as the drawing of graphs and charts. In each of these areas, numerous practical problems are included, each one calling for the application of the principles discussed in the text.

This revised edition has been expanded to bring it into harmony with modern practice.

J. W. Giachino is professor of industrial education at Western Michigan University, Kalamazoo. Henry J. Beukema is associate professor of drafting at the same institution.

Automotive Diagnosis and Tune-Up. (Second Edition.) Wetzel. Park Ridge, Ill.: Master Technical Press, 1960. Pp. 549. $6.50.

This book gives the basic theory needed for an understanding of automotive powerplant trouble-finding. It helps to pinpoint trouble and to explain how that trouble can be corrected.

A great deal of information is given that is not readily available to the average serviceman, and this information is profusely illustrated by 600 excellent drawings and diagrams. While the book was designed for use by the serviceman, it should be a valuable aid to students and apprentices who hope to become diagnosis technicians or tune-up men.

Guy F. Wetzel is technical editor for the *Automotive Digest*.

The Art and Craft of Screen Process Printing. Kosloff. Milwaukee: The Bruce Publishing Co., 1960. Pp. xii+173. $3.75.

The material in this book covers all types of screen process printing, even the more difficult phases such as halftone printing. The approach to the subject is simple, which makes it ideal for use as a reference by tradesmen as well as for use as a text in school work.

The material included ranges from the preparation of handmade equipment and use of machines to information on inks, screen fabrics, drying, and imprinting on various surfaces and materials.

In addition to being an excellent aid in teaching, it has some value as a bridge between the highly technical and the elementary books now available.

Albert Kosloff at present is assistant principal in South Shore High School, Chicago.

Know Your Car. Allen. Chicago: American Technical Society, 1960. Pp. vi + 154. $3.50.

This book is designed to provide pupils with a background in automobile fundamentals. At the same time it provides a sound basis for those who desire to go on to more specialized training.

The contents are divided into 27 convenient study units, which makes it suitable for use as a text. Its value as a teaching aid is increased by the review questions which appear at the end of each unit.

Willard A. Allen is an Associate Professor in the College of Education at Oswego, New York.

Ceramics. Roy. New York: McGraw-Hill Book Co., Inc., 1959. Pp. x + 278. $5.80.

This book is intended for use by beginners in the potters' craft, whether they be in school or working at it as a hobby. It is written in a form that makes it suitable for individual study, and it may be used as a handbook by individuals who have the responsibility of directing the activities of others in the field.

The book is well illustrated and the contents include material on designing, decorating, glazing, firing, and enameling. In addition, numerous projects are suggested, and the procedure to be followed in making them is outlined.

Vincent A. Roy is chairman of the Art-Teacher education department, Pratt Institute, Brooklyn, N. Y.

Pamphlets:

School Shop Safety is a 60-page U. S. Office of Education Circular, No. 609, which reports the results of the 1959 National Conference on School Shop Safety, held in Washington, D. C. It includes a digest of the findings, a set of recommendations, and a summary of the discussions. Available from U. S. Office of Education, Division of Voca-

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Electrical and Electronic Technology is a 16-page bulletin published by the U. S. Office of Education giving job descriptions and suggested techniques for determining courses of study in vocational-education programs. Available from the U. S. Office of Education, Division of Vocational Education, Area Vocational Education Branch, Washington 25, D. C.

Technical Symbol Charts, four in all, have been made available to shops without charge by the Eberhard Faber Pen and Pencil Company. They cover electronic, modern house design, basic engineering drawing, and building materials symbols. Printed on cardboard stock, 23" x 29". Available through the company at Crestwood, Wilkes-Barre, Pa.

Electrical and Electronic Technology is a 34-page publication of the U.S. Department of Health, Education, and Welfare. It is second in a series of booklets designed to provide information to help states organize and operate programs under Title VIII of the National Defense Education Act. Copies of OE-80004 may be secured from Division of Vocational Education, U.S. Office of Education, Washington 25, D.C.

Working with Light is a supplementary teaching program produced by the Better Light Better Sight Bureau. It includes a comprehensive 116-page lighting handbook, 24 project leaflets, and a reference folder for each of 24 students. For information about procuring a kit, write to the Bureau, addressing Dept. SS, P.O. Box 1647, Grand Central Station, New York 17, N.Y.

Supplement to AWS Bibliographies for 1959 is now available. The new supplement contains listings of articles appearing in *Welding Journal* from January through December 1959. Copies of the supplement are available for $1.50 from the American Welding Society, Dept. T., 33 W. 39th St., New York 18, N.Y.

Audio Visuals:

The Patterns of Progress is a 25-minute, color film showing what actually happens inside the mammoth machines that produce textiles. New movie-making techniques have allowed the producers to slow down the shuttles that bang away at 70 mph and the bobbins that rotate up to 10,000 rpm to speeds where they can be seen doing their work. Available on a free-loan basis from Modern Talking Picture Service, 3 E. 54th St., New York 22, N.Y., or any of its 30 regional film libraries.

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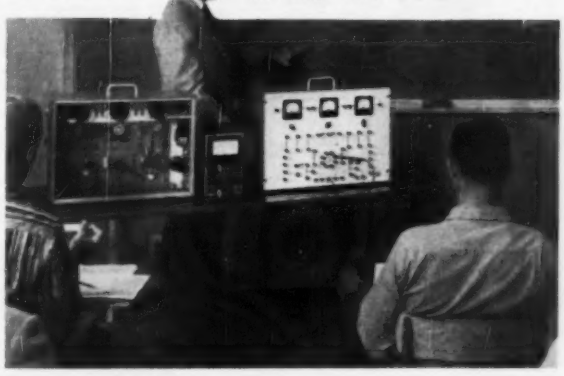

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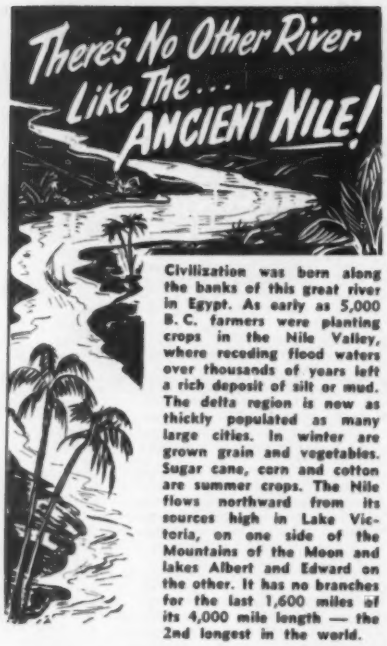

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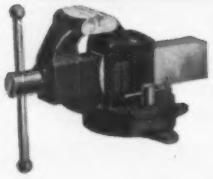

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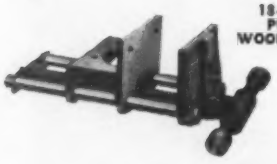

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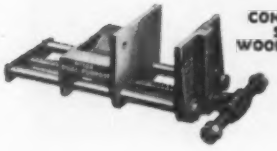

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Columnar-Type Legs Now Standard on South Bend's 10" Lathes

Newly designed floor legs are now standard equipment on South Bend 10" lathes, according to a recent announcement from South Bend Lathes, Inc., outlining the styling change.

The company states that former cast legs have been supplanted by columnar-type legs fabricated from heavy-gage steel. All-welded, reinforced construction is used throughout for maximum rigidity and strength, the manufacturer declares.

The headstock leg contains the underneath motor drive which has to be disengaged before the door in the leg can be opened. The two legs are connected by a deep U-section tray that can be used for storage, the company adds.

For more information write the company, South Bend 22, Ind., mentioning SCHOOL SHOP; or *circle no. S-1 on the business-reply card.*

Magnaflux and Magnaglo Now Available in Ready-to-Use Packages

Magnaflux and Magnaglo test materials are new available in push-button pressure cans and squeeze bottles for more convenient use, according to the manufacturer, Magnaflux Corporation.

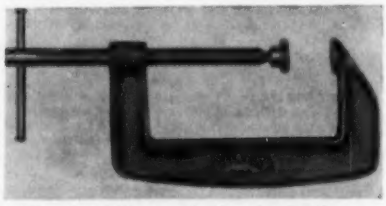
Magnaflux and Magnaglo powder and prepared baths were recently introduced to test for cracks or defects by magnetic particle inspection. The manufacturer points out that the new ready-to-use materials in squeeze bottles and pressure cans make this new sensitive test easy to do, even in the smallest shop. It adds that it can be used in schools in technical courses, in automotive and aircraft repair classes, and in science courses.

The ready-to-use Magnaflux-Magnaglo materials, the company states, eliminate previous bulky containers and the problems of mixing to formula.

For more information write the company, 7300 W. Lawrence Ave., Chicago 31, Ill., mentioning SCHOOL SHOP; or *circle no. S-2 on the business-reply card.*

Series 200 Line of C-Clamps Introduced by Wilton Tool

A new Series 200 line of C-clamps designed for use in school shops has been introduced by Wilton Tool Manufacturing Co.



The five different sized units in the new 200 Series, ranging from 3" to 10" with standard throat depth range from 1⅞" to 3⅝", are recommended by the company for use in both metalworking and woodworking shops. The new series, it states, is also ideal for service and maintenance mechanics.

The clamps are equipped with the Wilton Perma-Pad, the clamp swivel guaranteed never to come off, according to the manufacturer. Frames are made of highest grade malleable iron, and clamp screws have precision-cut modified Acme thread, it adds.

For more information write the company, Schiller Park, Ill., mentioning SCHOOL SHOP; or *circle no. S-3 on the business-reply card.*

Thermo's New, Small Hot Plate Reaches Top Heat in Nine Minutes

A Thermolyne hot plate, designed for shop applications where a small single or multiple precision heat source is needed, has been announced by Thermolyne Corporation, formerly known as Thermo Electric Mfg. Co.

The new hot plate, called Type 2300, incorporates a thermostatic control unit which provides stepless selection of temperatures ranging from 6°C above ambient to 370°C (700°F). From a cold start, the plate reaches 370°C in less than nine minutes, the company states.

The hot plate has a 3½" diameter top. The nickel chromium heating element is embedded in a refractory plate of new, high-purity refractory material. The cast-aluminum top plate is smooth, and it will not warp or buckle, the company asserts.

For more information write to the com-

pany, 490 Huff St., Dubuque, Ia., mentioning SCHOOL SHOP; or *circle no. S-4 on the business-reply card.*

Dillon Universal Tester Provides Experience in Material Testing

The Dillon Universal Tester, manufactured by the W. C. Dillon & Co., Inc., is said to permit tests in tensile, compression, transverse, and shear on virtually any material.

This portable testing center is particularly adapted to classroom instruction, the manufacturer states, providing valuable practical experience in eye-witness, laboratory testing of materials for high-school, junior-college, and university students.

Seven capacities are available, ranging from 0-250 lbs. to 0-10,000 lbs. There is also a choice of four different upright lengths to provide daylight openings between grips of 13, 20, 30, and 40 inches. There are also more than 15 different groups and fixtures to handle most commonly encountered specimens.

For more information write to the company, 14620 Keswick St., Van Nuys, Calif., mentioning SCHOOL SHOP; or *circle no. S-5 on the business-reply card.*

Modern Engineering Co. Markets Two Packaged Welding Outfits

Two new packaged professional welding and cutting outfits have been announced by Modern Engineering Co.

Outfit No. 1 features Meco's Weldmaster torch and cutting attachment with three welding tips and one cutting tip. Welding range with the tips included is up to ½" steel, the company states, and cutting range is up to 3" sections. The outfit also includes multiseat regulators, goggles, torch wrench, Triple-Flint lighter, a 12½' length of 3/16" hose and a 40-page instruction manual.

Outfit No. 2 features Meco's Aviator-Jet welding torch and cutting attachment. The welding range with the tips included is up to 5/16" steel, and the cutting range is up to 1¼" sections. The remainder of the outfit is the same as Outfit No. 1.

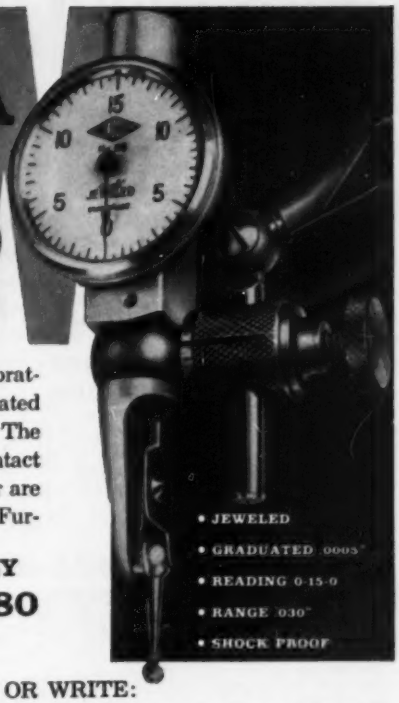
For more information write to the company, 3401-15 Pine Blvd., St. Louis 3, Mo., mentioning SCHOOL SHOP; or *circle no. S-6 on the business-reply card.*

Wells Power Saw Designed to Be Used Like Hand Saw

Wellsaw 400 electric hand saw, a new product of Wells Manufacturing Company, is said to be the first portable power saw designed and made to be used like a hand saw.

This modern power version of the hand saw will do just about everything you can do with a nonpowered hand saw, the company states. Like a hand saw, it can be used with one hand. The blade cuts on both strokes with no kick or pull, eliminating the

NEW ALINA No. 88



A fully reversible indicator incorporating a clear easy-to-read dial, graduated in half thousandths of an inch. The TWO hardened chrome plated contact points of .030" and .100" diameter are equipped with a non-slip ratchet. Furnished complete with a universal shank, body clamp, and plush lined steel case.

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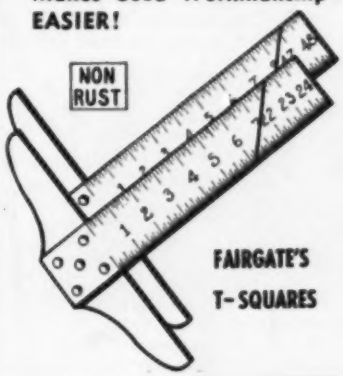

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need for foot or table, the company declares. The saw cuts at 8,000, 1⅛" strokes per minute. As a safety factor, the company emphasizes that the blade stops in less than 1½ seconds after the trigger is released.

Other features of the new saw pointed out by the company include: patented blade design removes sawdust from kerf, a built-in blower clears chips from work line, and the blade can be changed easily and quickly.

Designed for operator safety, the Wellsaw 400 has an 8" maximum cutting capacity. It weighs approximately eight pounds.

For more information write to the company, 460 Fourth Ave., Three Rivers, Mich., mentioning SCHOOL SHOP; or *circle no. S-7 on the business-reply card.*

Mark V Fine-Line Automatic Pencil Said Ideal for Lettering Guides

Alvin & Co. announces that its new Mark V fine-line automatic propelling lead pencil never needs pencil sharpening or lead pointing.

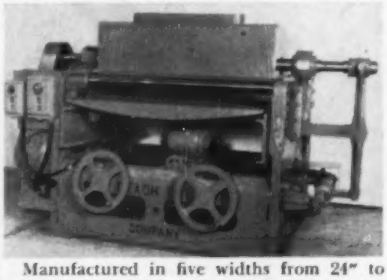
The new Mark V, which is said to supply an ever-pointed extra thin lead, .031" thick, is ideally suited for use with lettering guides or templates, the manufacturer states. The firm points out that it has a nonrolling hexagonal barrel with a comfortable, knurled, tapered finger grip.

Two models are available, the Mark V, standard, and the Mark V-P, special pocket model.

For more information write to the company, Windsor, Conn., mentioning SCHOOL SHOP; or *circle no. S-8 on the business-reply card.*

New Beach Oscillating Sander Has Aluminum Drum

A high-speed oscillating sander with aluminum drum, said to be especially developed and priced to meet the needs of school shops and smaller woodworking shops, is a new product of Beach Manufacturing Company.



Manufactured in five widths from 24" to 48", the new Beach sander is adaptable for all types of drum sanding, the company declares. The aluminum drum, 12" in diameter, takes standard 38" sandpaper without waste, the manufacturer points out. Oscillation of the drum is by straight-line thrust, and it is automatically increased as the feeding speed increases. All control functions and adjustments can be handled from the front of the sander.

For more information write to the company, Montrose, Pa., mentioning SCHOOL SHOP; or *circle no. S-9 on the business-reply card.*

New Long-Arm Radial Saw Announced by Delta

A new long-arm radial saw has been in-

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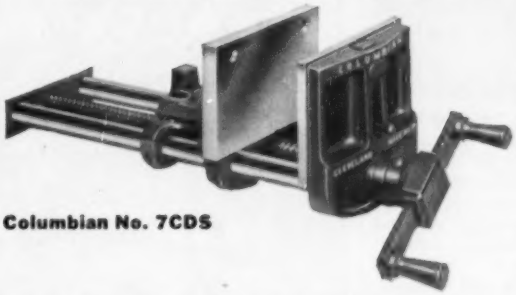

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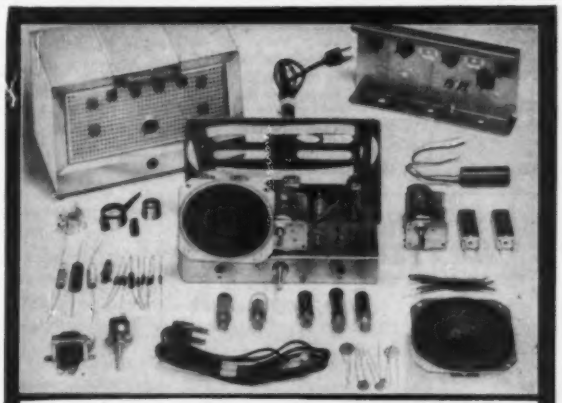

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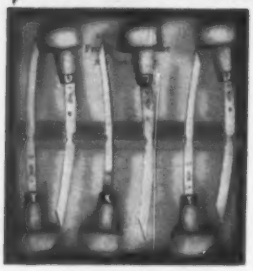

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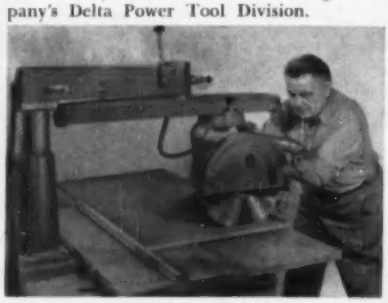


The company reports that the extra capacity in the new Delta Long Arm Radial Saw makes it particularly suitable for use in the vocational building trades. The firm points out that the longer track and overarm enables the saw to provide increased left-hand miter capacity, greater cross-cut capacity, and extra-wide rip capacity.

Capacities of the new saw are: cross-cut, 1" stock, 24"; maximum rip, 36"; maximum depth of cut, 4⅛"; and dado capacity with 10" dado, 1½" wide. Motors of 2, 3, or 5 hp are available.

For more information write to the company, 474 N. Lexington Ave., Pittsburgh 8, Pa., mentioning SCHOOL SHOP; or *circle no. S-10 on the business-reply card.*

Automatic Band-Saw Safety Guard Introduced by Hauer Co.

An automatic band-saw safety guard with a built-in light has been introduced by Hauer Co.

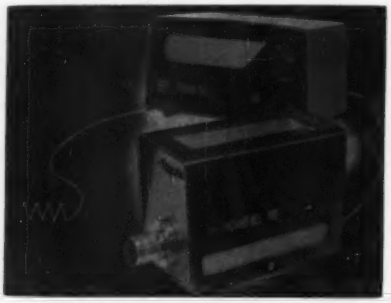
The new guard, the manufacturer claims, automatically covers the blade at all times —before cutting, during, and after cutting. At the same time, the light in the guard beams its ray on the mark for more accuracy, more speed, and complete safety, the company declares.

The clear, plastic shield is said to be adjustable to allow for various thicknesses of stock, and it automatically returns to the table top after the cut is made.

The new guard is designed to fit any band saw, and installation is simple, the manufacturer states.

For more information write to the company, RFD #1, Putnam Valley, N.Y., mentioning SCHOOL SHOP; or *circle no. S-11 on* the business-reply card.

Camera for Closed-Circuit TV Produced by Packard Bell



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classes, as well as for other schoolroom applications, is now being produced by Packard Bell Electronics Industrial Products Department.

Packard claims the new Telecaster camera is the first to be completely transistorized, providing better than broadcast-quality transmission and high mechanical dependability.

A separate control unit operates a small camera. Monitors can be spotted anywhere within the shop for student viewing. The Telecaster camera, the company states, can be used with a regular TV receiver or with a video monitor.

The outfit also affords students the opportunity to obtain working knowledge of closed-circuit television, the company points out.

For more information write to the firm, 1920 S. Figueroa St., Los Angeles 7, Calif., mentioning SCHOOL SHOP; or *circle no. S-12* on the business-reply card.

Robert W. Campbell Named Head Stanley Tool's Educational Dept.

Mr. Campbell

Robert W. Campbell has been named manager of the educational sales department of Stanley Tools, New Britain, Conn., succeeding Fred J. Gross who retired in July after 50 years of service. Announcement of the new appointment was made by Charles L. Lohmeyer, general sales manager.

Mr. Campbell, who lives in Stafford Springs, Conn., joined Stanley in 1954. He has been a member of the educational sales department since 1955.

B-G West Coast Representative

Mr. Manne

The Brodhead-Garrett Company, Cleveland, Ohio, has announced the appointment of Tony Manne as its west coast representative.

Mr. Manne, a graduate of North Illinois University, was formerly a teacher at Chico State College, Calif. His business address is 39 Dean Way, Chico.

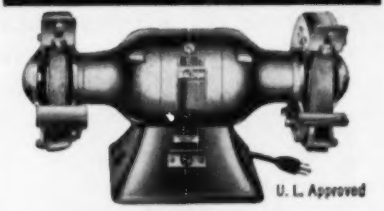
New Literature:

Forms 1129, 1117, and 1126 are three, new brochures recently published by Champion Pneumatic Machinery Co. Form 1129 covers the Champion Commandair series of single-stage compressors, ¼ through 2 hp. Form 1126 covers the entire Champion two-stage and single-stage compressor line. Form 1117 covers the Challenger line of air compressors. For copies of the brochures write to the company, 825 N. Pleasant St., Princeton, Ill., mentioning SCHOOL SHOP; or *circle no. S-13 on the business-reply card.*

School Shop Equipment is a new, 16-page catalog published by Angle Steel, Inc.

The catalog gives complete details on Angle Steel's line of one-, two-, and four-student benches, shop lockers, cabinet lockers, shop benches, bench tops, drafting and drawing tables, welding benches, cabinet benches, tool cabinets, desks, planning and layout tables, stools, unit work benches, and accessories. For a copy of the catalog write to the company, Plainwell, Mich., mention-

SAFE!



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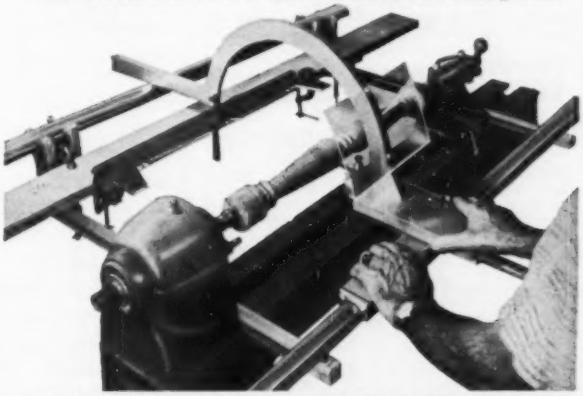

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Ford IAA Winners

Three teachers had multiple Outstanding Achievement Award winners in the 1960 Ford Industrial Arts Awards contest. The judging for the 32 top winners among the 4,000 entries in Dearborn was conducted in July by industrial-education leaders from 22 states and Canada.

David A. Rigsby of Woman's College Training School in Greensboro, N.C., a perennial winner, was the instructor of four Outstanding Achievement Award winners, all in woodworking. Bruno Piefke of Essex County Vocational-Technical High School, Newark, N.J., had two of his students win top awards, both in machine shop. C. C. Owen of Harlingen, Tex., High School, also had two of his students included among the top winners, one in leather and one in ceramics.

The 32 Outstanding Achievement Awards were part of 639 winners of cash prizes, valued at approximately $50,000 in the final phase of the international competition. California had the most cash winners, 102. Next came Pennsylvania with 68, Illinois with 61, Michigan with 40, Ohio with 37, New Jersey with 30, and New York and Texas had 27 each.

Of the 32 top award winners, two students received two Outstanding Achievement Awards. James Cary of Altadena, Calif., won a top prize in the architectural drawing division and one for creative design. Tom Tierney of Joliet, Ill., won the top

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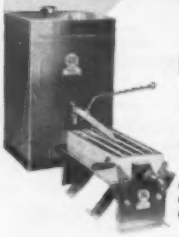

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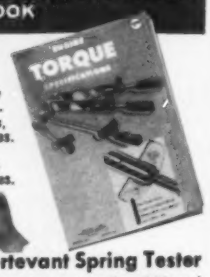

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The 32 Outstanding Achievement Award winners and their instructors will be guests of the Ford Motor Company for a three-day, all-expense-paid trip to Dearborn this fall. These winners, their projects, and instructors are:

Architectural Drawing: James Cary, 14, Altadena, Calif., model beach home—Roy Bredin, instructor; James W. Lester, 18, Long Beach, Calif., working set of plans for residence—B. H. Palmgren, instructor; Kent E. Parrett, 17, Prairie Village, Kan., model of a contemporary ranch-type home—Chauncey Gorsage, instructor; and G. Donald Cook, 18, Ardmore, Pa., plans for a junior-senior-high school—William Loeliger, instructor.

Ceramics: Barbara Howard, 17, Harlingen, Tex., set of thrown ceramic pieces: lamp, bowl, and rice bowl—C. C. Owen, instructor.

Electrical: Gerry Russell, 13, Culver City, Calif., transistorized intercommunication unit—J. Harvey Seiple, instructor; Robert D. Shonyo, 18, San Leandro, Calif., a "picture and pattern" video generator—Nicholas Saba, instructor; James T. Stewart, 14, San Diego, Calif., Tesla coil—Donald H. Stansifer, instructor; Tom Tierney, 13, Joliet, Ill., electrical control panel—John Hickman, instructor; Dave Bearden, III, 17, Wichita, Kan., 10-room fire alarm system—L. C. Bork, instructor; and Roger E. Neafus, 17, West St. Paul, Minn., a-c arc welder with welding manual and working drawing—Curtis M. Johnson, instructor.

Graphic Arts: Roy Nakagawa, 14, Gardena, Calif., display folder of President Wilson—Gus Barlow, instructor; Emmett Colbert, 17, Phoenix, Ariz., printing process, a book entitled "The History and Romance of the Pistol"—C. J. Johnson, instructor; and Frank Johnson, 18, Chicago, Ill., printed letterhead, envelope, invoice, and calling card—Robert P. Urchel, instructor.

Leather: Ruben Anzaldua, 17, Harlingen, Tex., western-style hassock with deer-skin top—C. C. Owen, instructor.

Machine Shop: Sidney Johnson, 18, Staples, Minn., compound sine plate—Michael J. Matanich, instructor; Thomas A. Ciampi, 15, Newark, N.J., adapters for milling machine spindles—Bruno W. Piefke, instructor; Peter A. Goegl, 17, East Orange, N.J., shop microscope for checking surfaces on machine-tool parts—Bruno W. Piefke, instructor; and Michael Kurowski, 17, Newark, N.J., universal indexing fixture—William A. Morgenroth, instructor.

Models: Wayne Sasabe, 15, Los Angeles, Calif., 36" model racing yacht—Walter E. Thompson, instructor; and David Fausch, 17, Morristown, Minn., scale model of steam engine—Urban Anderson, instructor.

Open Division: Robert Derins, 13, Philadelphia, Pa., M-1 rocket with description and breakdown of components—Alphonse S. Zimba, instructor.

Pattern-making and Molding: Joseph R. Coppola, 18, Beverly, Mass., wood pattern for core-box machine housing—Robert J. Tate, instructor.

Plastics: Dwayne Peterson, 15, Osseo,

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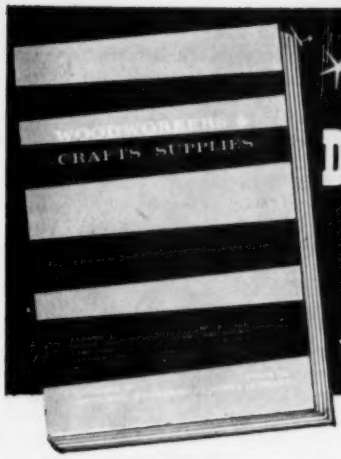

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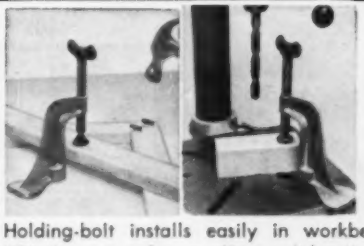

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Washington . . . *from page* 68

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Toward an Understanding.—Toward the end of June, Washington staff members of the area vocational education branch traveled to Kansas City, Kan., to conduct a national conference on technical education. They returned to Washington pleased with the results. When we talked to some of the 63 state supervisors concerned with Title VIII programs who were present at Kansas City, we found them, in turn, as pleased with what had taken place there.

"Those of us who attended the Kansas City meeting are a lot closer together now in our understanding as to what technical education is and what it will require of us in the months ahead," said one state supervisor who had taken an active part in the Kansas City proceedings.

Before Kansas City there was wide diversity of opinion, even fuzziness of concept, among some state people as to what technical education is. The Kansas City meeting hasn't erased all the fuzziness. But it is clear to this reporter that more state workers now understand that technical education is of grave importance to the security and economy of the nation. They now know that no educational venture is as severely scrutinized by the nation's employers and industries as are the programs under Title VIII. Industry expects much; government will demand much. One example: The Federal Aviation Agency alone can use more than 2,000 electronic-technician graduates a year for the next five years. Heard at the conference: "This is *the* critical decade. The results of vocational agencies in the field of technical education may well determine the future leadership role of

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vocational education in the United States."

The Kansas City meeting impressed on state workers that changing the label of an old trade course does not magically turn it into a technical-education course; that technicians must be trained for job clusters rather than for single-skill occupations; and that emphasis on math and science concepts is the true hallmark of job-cluster technician training.

The Kansas City conferees also came closer to understanding the enormity of the technician-training job confronting public education. Technicians are needed, and will be needed, for at least eight critical occupational fields, including aeronautical, chemical and metallurgical, civil and construction, electrical, electronics, instrumentation, mechanical, production jobs. Heard at the conference: "There are administrative implications in course and curriculum titles. Hence, states reporting to the Office of Education should classify all Title VIII offerings under these eight broad areas. Such classifications will be more easily understood by Congress, federal agencies, and by industry."

The Kansas City conferees now know that they have to face up squarely to issues which will demand hard work, imagination, and dynamic leadership.

New curriculums and new teaching materials must be developed. (In response to the needs, the U. S. Office of Education has just released two guides outlining the course offerings, laboratory layouts, and equipment lists. One guide deals with the electronics technology, the other with electrical technology. Local educators will be able to adapt these to their own use and conditions.) Only those students must be selected for training who will benefit from instruction. Only those teachers must be selected and trained who understand that traditional ways of teaching a trade are not suitable for technician education.

We learn that it is on teacher training for technical education that the Kansas City conference may make its greatest impact. The conferees accepted the challenge that T & I teacher-education procedures of the past are not adequate for the present and for the future of technical education. The familiar routine of trade analysis, history, organization of the trade, etc., etc., will not produce teachers of highly skilled technicians

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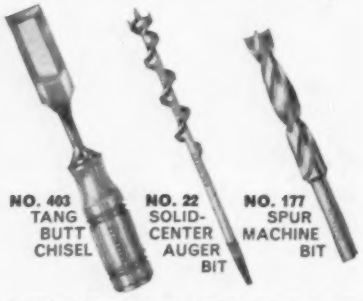

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for the latter half of the twentieth century. Heard at the conference: "The major emphases in technical education are on laboratory and classroom teaching-learning experiences. Hence, the teacher education of the future must take into account those redirections and make modifications in the teacher-education program."

Walter Arnold, who, as head of the area vocational education branch of the U. S. Office of Education, had organized the Kansas City affair, had this to say about it:

"The earnest, studious contributions by speakers and participants alike in the important and sometimes controversial aspects of vocational-technical education demonstrated once again that vocational educators everywhere can establish and operate highly qualified training programs to meet new needs."

Reduced to Four.— Of making long lists of industrial-arts objectives there is no end; and most of them are a weariness of the flesh.

It takes a bold man, therefore, to make still another list of the goals toward which industrial arts should strive and keep them to four points. This was recently done by Ivan Hostetler, North Carolina State College.

Dr. Hostetler declared that it is the aim of industrial arts to:

(1) develop in each student an insight and understanding of industry and its place in our culture;

(2) discover and develop talents of students in the technical field and applied science;

(3) develop technical problem-solving skills relating to materials and processes;

(4) develop in each student a measure of skill in the use of common tools and machines.

Dr. Hostetler achieved this feat at a conference held in Washington last June. It was called by Marshall Schmitt, Office of Education industrial-arts specialist. Because funds were limited, Dr. Schmitt invited only 16 leaders in industrial arts and kept the meeting to only two days and a night session.

It was a small, short meeting; it was weighty in tone and substance. Thus, Lee Hornbake, University of Maryland, discussed the place of industrial arts in the American culture. Delmar Olson, Kent State University, identified the guidelines which should be followed in determining curriculum content for industrial-arts stu-

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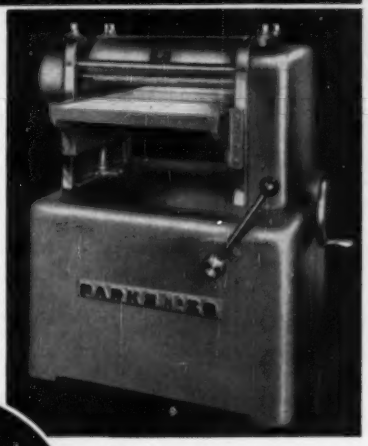

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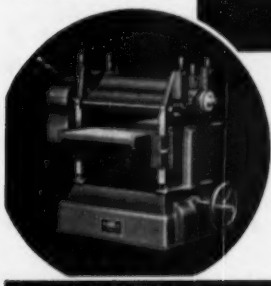

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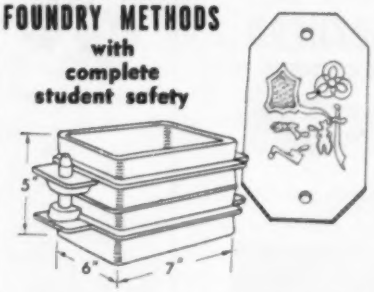

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dents. Robert Woodward, California State Department of Education, looked at the relationship of industrial arts to other subjects. John A. Jarvis, Stout State College, discussed the changes needed to meet the needs of the gifted and slow learner.

Even this partial list of topics shows that the conference dealt with what Dr. Schmitt calls "the major problems and/or issues in the field." It is Dr. Schmitt's plan to publish the proceedings in full. But here are a few choice items from the discussions which you can think about:

"1. The American people have talents other than verbal and literary. They also have creative and expressional talents. When these are combined with science and math, the result is a people capable of inventive genius and effective production.

"2. It is the role of industrial arts to identify and develop people with such creative talents.

"3. There is no need to throw out what we have in industrial arts and start all over again. Rather we must build into the subject what we know is good and take out those segments which do not contribute to our aims.

"4. Industrial arts is basically sound in structure. But we must upgrade, deepen, and broaden our offerings. We are not teaching all the things that we have outlined in our teachers' guides and courses.

"5. We must rethink industrial arts so it will make full educational sense in the American culture, or we will be reduced to a program of caretaking for the slow learner.

"6. The word 'shop' should be dropped from our vocabulary as a subject and especially from being listed on student and school schedules. The phrase industrial arts or the name of the course should be used. The junior-high school is the main offender in misnaming our offerings.

"7. A long list of objectives for industrial arts as a whole is meaningless."

This brings us round to the starting point of this brief dispatch – namely, objectives. So important is this topic that our brief space cannot do justice to it. We urge you to read the complete text of the June conference proceedings when it is released by Dr. Schmitt. The document will probably appear under the title "Improving Industrial-Arts Teaching in the Public Schools," which was also the theme of the meeting. ★

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from Washington

by Michael Paca

Civics Lesson. – A piece of legislation does not necessarily pass Congress even though it passes both Houses of Congress. This was the summer's lesson in civics, and it held true for the federal-aid-to-education bill, at least up until August 8. On that date the Congress came back to work from a July recess and once again had to face the question of what to do about federal aid to education. There was the Senate-approved bill, asking for aid for school construction and teacher salaries. There was the House-approved bill restricting aid to school construction. And in the middle, blocking the right to a conference between the chambers so that they might adjust their differences, was the House Rules Committee.

The 1960 political party platforms offered no hope that this dilemma might be resolved easily. The 1960 Republican platform took a position similar to that of the House – federal aid for school construction only. The Democratic platform took a position similar to that of the Senate – aid for both construction and teacher salaries. How these differences were to be reconciled constituted a test of adroitness for Senate majority leader Lyndon Johnson and of tenacity for Vice-President Richard Nixon. Both men had to achieve victories in the Senate during the remaining days of the session – victories which they could use as campaign ammunition between now and November.

Both political party platforms went beyond their pledges for their particular brands of federal aid to education. They either promised or paid verbal respects to the importance of libraries, scholarships, speeded-up integration, and basic educational research. So that the record shall be clear, here is what the two parties said about vocational training:

Democrats: "The new Democratic Administration will reaffirm the right to a useful and remunerative job. The right to a job requires planning for automation, so that men and women will be trained and available to meet shifting employment needs."

Republicans: "We pledge . . . stimulation of actions designed to update and strengthen vocational education for both youth and adults."

This Past Summer. – The summer's unusual post-convention session of the Congress, and the political conventions themselves, did not obscure other summer events. Nikita Khrushchev insisted (as he did before an all-Russian congress of teachers) that Soviet education must be organically connected with socially useful labor. H. H. London, Missouri, and Mark Nichols, Utah, came back from the Soviet Union to tell the American nation that the Reds are indeed putting more emphasis on vocational education than they did a few years ago. These two observant vocational educators stressed in their report that the Russians are doing a thing we should consider seriously in this country. That is, train every individual as much as possible for production efficiency in terms of his native ability and the needs of society.

In the main, however, educators this summer seemed less worried about what Russia is doing and more concerned about what the United States should do. The President's Commission on National Goals was still at work, considering papers on educational goals. A full report was promised by December. The Educational Policies Commission was reviewing its umptieth draft of what the controlling purposes of American education should be. And the National Education Association launched a project to find out what instructional programs schools should incorporate during the coming years.

The NEA, incidentally, made more than the usual amount of news during the summer. It reached an all-time high in membership – 714,000; added two new departments to its structure, one of school librarians, the other of driver-education people; and moved a bit closer to saying that it really favored integration of schools in the South after all. But the most interesting news came from its 1960 convention. Delegates picked as president-elect for next year a junior-high-school crafts teacher. He is Ewald

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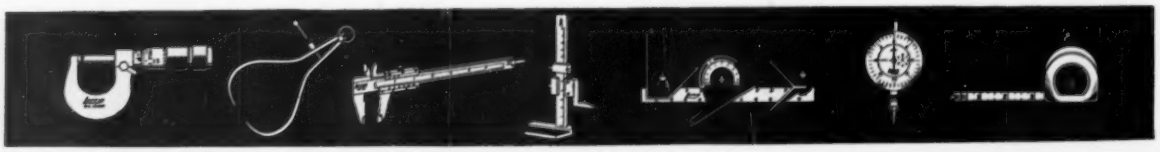
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